505 Montgomery Street, Suite 2000
San Francisco, California 94111-6538
Tel: +1.415.391.0600 Fax: +1.415.395.8095
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April 28, 2010

VIA FEDERAL EXPRESS

Taly L. Jolish
Assistant Regional Counsel
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (ORC-3)
San Francisco, CA 94105

Re: Response to EPA Comments Regarding Montrose Feasibility Study

Dear Ms. Jolish:

Please find enclosed Montrose Chemical Corporation of California's ("Montrose") detailed responses to the legal issues raised by the Environmental Protection Agency, Region 9, Staff's ("Staff") January 27, 2010 comments on Montrose's draft DNAPL feasibility study ("FS") for the Torrance Site ("Site").[1] The enclosed responses address each comment on a comment-by-comment basis. This letter provides an overview of Montrose's principal legal concerns about the cumulative effect of the Staff's comments and directions in order to clearly identify the legal deficiencies of these positions when compared to the substantive requirements for remedy selection under CERCLA and the National Contingency Plan.

I. APPLICABLE STANDARDS FOR EVALUATING REMEDIAL ALTERNATIVES IN FEASIBILITY STUDIES

A. National Contingency Plan Factors

The National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 ("NCP"), requires that a feasibility study ("FS") analyze each remedial alternative against nine specific substantive criteria. 40 C.F.R. § 300.430(e)(9)(iii). At the outset, an alternative must satisfy two "threshold" criteria: (i) overall protection of human health and the environment, and (ii) compliance with Applicable or Relevant and Appropriate Requirements ("ARARs"). 40 C.F.R. § 300.430(f)(1)(i)(A). To satisfy the first, a remedy must adequately protect human health and the environment, in the short- and long-term, from unacceptable risks posed by hazardous substances. 40 C.F.R. § 300.430(e)(9)(iii)(A). With regard to the second threshold criterion, the alternative must be able to attain ARARs, under federal and state law, or provide grounds for a waiver.

[1] Montrose is submitting its responses to the Staff's technical comments under a separate cover.

If the threshold criteria are satisfied, the alternative is then evaluated against five "balancing" criteria: (i) long-term effectiveness and permanence; (ii) reduction of toxicity, mobility or volume through treatment; (iii) short-term effectiveness; (iv) implementability; and (v) cost. 40 C.F.R. § 300.430(f)(1)(i)(B). While the balancing must emphasize long-term effectiveness and reduction of toxicity, mobility or volume through treatment, the selected alternative must also provide the best balance of trade-offs among these five criteria. 40 C.F.R. § 300.430(f)(1)(i)(E).

Finally, the "modifying" criteria of (i) state and (ii) community acceptance must also be considered. 40 C.F.R. § 300.430(f)(1)(i)(C). The FS should discuss the state's position and key concerns related to the alternatives, to the extent known at the time of the FS. 40 C.F.R. § 300.430(e)(9)(iii)(H). The FS should also determine whether the community opposes or has reservations about any aspect of the alternatives. 40 C.F.R. § 300.430(e)(9)(iii)(I). While an assessment of state and community concerns should be included in the initial FS to the extent possible, the assessment cannot be completed until after public comments have been received on the draft FS.

B. Remedial Action Objectives

The NCP also requires the lead agency to establish remedial action objectives ("RAO's") identifying goals for the remediation. 40 C.F.R. § 300.430(e)(2)(i). The following DNAPL RAO's were established for the Montrose Site:

1. Prevent human exposure to DNAPL constituents (via ingestion, inhalation, or dermal contact) that would pose an unacceptable health risk to on- or off-property receptors under industrial land uses of the Montrose plant property and adjacent properties;

2. To the extent practicable, limit uncontrolled lateral and vertical migration of mobile NAPL under industrial land use and hydraulic conditions in groundwater;

3. Increase the probability of achieving and maintaining containment of dissolved-phase contamination to the extent practicable, as required by the existing groundwater ROD, for the time period that such containment remains necessary;

4. Reduce NAPL mass to the extent practicable;

5. To the extent practicable, reduce the potential for recontamination of aquifers that have been restored by the groundwater remedial actions, as required by the groundwater ROD, in the event containment should fail; and

6. To the extent practicable, reduce the dissolved-phase concentrations within the containment zone over time.

C. Interpretation and Application of NCP Factors and RAO's

The remedial goals should establish acceptable exposure levels that will not cause adverse effects to human health, taking into account risk levels and factors related to uncertainty. 40 C.F.R. § 300.430(e)(2)(i)(A). Accordingly, the NCP does not require RAO's and cleanup goals that would remove all of the contamination from a site.

To that end, both CERCLA and the NCP repeatedly use the phrases "to the extent practicable" or "to the maximum extent practicable" to describe how the selection of a remedial alternative must balance statutory and regulatory goals with the site-specific RAO's and cleanup goals. See, e.g., 42 U.S.C. § 9621(b); 40 C.F.R. § 300.430. Before a remedy is selected, EPA must find that the remedy will "utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable." *Id.* EPA guidance defines "to the maximum extent practicable" as the remedy that "provides the best balance of trade-offs" among the NCP criteria so that permanent solutions and treatment can be cost-effectively used at the site. EPA, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents at 6-51–6-53, EPA 540/R-98/031, OSWER 9200.1-23P (July 1999) ("Guide to Preparing RODs"). Therefore, the final selection of a remedy must identify the one protective, ARAR-compliant, cost-effective alternative that provides the "best balance of trade-offs." Guide to Preparing RODs at 6-51–53.

As noted, the cost of a remedial alternative must be considered when balancing trade-offs and determining whether the alternative satisfies cleanup goals. EPA, Nat'l Oil and Hazardous Substances Pollution Contingency Plan, 55 Fed. Reg. 8666, 8729 (Mar. 8, 1990) ("Preamble to 1990 NCP"). A remedy does not satisfy "the maximum extent practicable" standard if its costs are "grossly excessive compared to the overall effectiveness." 40 C.F.R. § 300.430(e)(7)(iii); Preamble to 1990 NCP, 55 Fed. Reg. at 8714. Furthermore, while the selected remedy must utilize permanent solutions or treatment to the maximum extent practicable, the selected remedy must always be cost-effective. 42 U.S.C. § 9621(a), (b).

EPA's past practices reflect these standards. At the Tar Creek Superfund site, for example, EPA determined that certain remedial alternatives were impracticable solely because they were 35% more expensive than the selected remedy, even though the more expensive remedies would have utilized treatment technologies more effectively. EPA, Record of Decision: Tar Creek (Ottawa County) OU2 at 21–44 (Aug. 27, 1997). Because the additional expenses were significant, the more expensive alternatives were found to be not practicable despite their technical superiority. *Id.* at Declaration: Statutory Preference for Treatment as a Principal Element is Not Met and Five-Year Review is Not Required.

Recognizing that practical considerations and balancing of trade-offs must be accounted for when implementing CERCLA and the NCP, site-specific RAO's themselves often incorporate the phrase "to the extent practicable" (as is the case here). For example, the ROD Amendment for the Lower Fox River and Green Bay Superfund Site sought to "[a]chieve, to the extent practicable, surface water quality criteria" to reduce PCB concentrations in surface water. EPA, Record of Decision Amendment, Lower Fox River and Green Bay Superfund Site at 12 (June 2007) ("Fox River AMD"). After evaluating the extent of PCB contamination, EPA

recognized that it could not require cleanup of all contamination because of the potential for adverse environmental effects and the public inconvenience of trying to do so. Fox River AMD, Appx. A at 164,165. Thus, where countervailing considerations are present, the "to the extent practicable" standard obviates any perceived requirement to remediate a site "to the extent possible" in order to allow for the best balancing of all competing NCP factors.

Regardless of whether or not RAO's include the "to the extent practicable" language, EPA has, in the past, selected the remedy that is most "practicable" for a particular site. *See, e.g.*, EPA, Record of Decision: Calhoun Park Area at § 10.2.10, R04-02/028, (Sept. 24, 2002). In choosing a remedy to cleanup contaminated sediments in the Calhoun Park Area, for example, EPA compared one alternative, which paired an existing sand blanket system with monitoring, to another alternative which involved excavation, off-site thermal desorption and backfill with monitoring. *Id.* at § 10.2. Although the latter alternative would have removed a greater volume of contaminant mass, the additional costs and potential for increased mobilization of contaminants were significant concerns. As such, the first alternative was found to be the most "practicable" because it met the applicable RAO's at a lower cost, with less inconvenience and greater safety. *Id.*

In short, CERCLA simply does not require that a contaminated site be remediated to the maximum extent feasible. Rather, determining whether a remedial alternative meets RAO's requires balancing the trade-offs among the NCP criteria, and cost is a key factor in the balancing process. Both CERCLA and the NCP require the rejection of a technologically superior remedy if it is not practicable (or not cost-effective, as discussed below). Where costs or public safety concerns arise, EPA has not and cannot interpret RAO's to require remediation to the fullest extent possible, but instead has, as it must, selected the most "practicable" cost-effective remedy, which is precisely what the Montrose DNAPL RAO's call for in this case.

II. STAFF'S COMMENTS REFLECT A MISAPPLICATION OF THE NCP CRITERIA AND THE RAO'S

Our overarching concern with the Staff comments is that they effectively direct Montrose to submit a FS that does not fully and accurately present and analyze the relative costs, benefits, risks and detriments of the two major remedial alternatives – hydraulic displacement ("HD") and thermal treatment. Instead, the Staff have directed Montrose to grossly understate the potential benefits and overstate the limitations of HD (thus eliminating it from consideration altogether), while at the same time directing Montrose not to consider the adverse environmental impacts of thermal remedy greenhouse gas ("GHG") emissions in the remedy selection process, to understate the probable cost and risks (environmental and human health) of thermal remedies, and to significantly overstate their likely effectiveness in removing DNAPL from the Site based on the thermal remedy design features that the Staff have required Montrose to assume. The net effect of these comments is to prevent a full and realistic presentation of the remedial alternatives so that their merits can be evaluated and compared objectively, and instead to compel the selection of a thermal remedy based on an artificially and arbitrarily constrained analysis of the remedial options.

A. Greenhouse Gas Emissions Must Be Considered in Remedy Selection

One of the primary issues discussed in the enclosed responses concerns the evaluation of GHG emissions in selecting a remedy. In their comments, the Staff have taken the position that GHG emissions may not be considered, except in the context of the short-term effectiveness criterion. The Staff contend that consideration and minimization of GHG emissions is not a part of the remedy *selection* process, but instead can only be evaluated during the design of a remedy whose selection has not been influenced by any evaluation of its own environmental footprint. The Staff also state that the FS should disregard state and community concerns about GHG issues until after the public comment period.[2] Both of these contentions are incorrect, and if applied in this case, would deny the remedial action decision-maker access to the full array of information and considerations necessary for an objective assessment and comparison of the principal remedial alternatives.

First, the assertion that GHG emissions should not be addressed during the remedy selection process is plainly contrary to EPA's most recent policy statements regarding the importance of incorporating "green" practices into site remediation, including reducing GHG emissions. These EPA policy statements provide, for example, that reducing GHG emissions from remedial activities should be considered "during any phase of work, including...evaluation of cleanup options," and that a FS may appropriately "include comparison of the environmental footprint expected from each cleanup alternative, including GHG emissions . . . ." EPA, Principles for Greener Cleanups at 1 (Aug. 27, 2009); EPA, Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites at 20, EPA 542-R-08-002 (April 2008). Another EPA policy document states that the FS is in fact the "optimal phase" in which to begin evaluating GHG reduction measures. EPA Region 9, Smart Energy Resources Guide at 2, EPA/600/R-08/049 (March 2008) (hereinafter, "EPA Energy Guide"). Most recently, the Council on Environmental Quality ("CEQ") issued a draft guidance with regard to GHG analysis in the context of the National Environmental Policy Act. Council on Environmental Quality, Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (Feb. 18, 2010). The guidance states that, where a proposed action implicates significant levels of GHG emissions, information on GHG emissions that is useful and relevant to the decision should be considered in connection with the evaluation of alternatives. *Id.* at 1, 2.

Similarly, California recently adopted a policy statement that directs agencies to consider regional and global impacts of emissions for remedial alternatives in feasibility studies, including analyses of GHG emissions. See, e.g., California Department of Toxic Substances Control, Interim Advisory for Green Remediation, December 2009.

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[2] Although the Staff would prohibit discussion of State and community concerns about thermal remedy GHG emissions, they inconsistently contend with respect to HD that purported State and public concerns about the reinjection of contaminated water into a more highly contaminated aquifer is a reason to reject HD.

Thus, failing to consider GHG emissions in remedy selection is contrary to the most recent green remediation policy pronouncements by EPA, CEQ and the State of California, not to mention contrary to common sense, and would be an especially grave error here given the very high GHG emissions that would result from the thermal remedies, as reflected in the following table.

Candidate DNAPL RA	Carbon Footprint Analysis – Carbon Dioxide Emissions Summary[3]		
	Total Mass of CO_2 Released (lbs)	Trees Required to Offset CO_2	Acres Required to Support Trees
HD	4 million	27,000	45
Steam Injection, Focused[4]	130 million	850,000	1,400
Steam Injection, Full-Scale[5]	520 million	3,400,000	5,600
ERH, Focused	25 million	162,000	270
ERH, Full-Scale	93 million	600,000	1,000

It is important to note that the Staff's comments now direct Montrose to present a discussion of full-scale steam injection without any consideration in the remedy selection phase of the fact that this alternative would likely release more than 500 million pounds of carbon dioxide into the environment.[6]

Second, an evaluation of GHG emissions in remedy selection is already required by a number of NCP criteria other than consideration of short-term effectiveness during the remedial design process. Indeed, "[t]he primary objective of the . . . [FS] is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected." 40 C.F.R. § 300.430(e). The remedial alternatives are analyzed by evaluating each

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[3] Assuming 8 pore volumes for the steam injection (which was required at the SCE Visalia site), and 400kW-hours for ERH.

[4] Focused steam injection using 3 and 6 pore volumes of steam would emit 52 million pounds and 100 million pounds, respectively. Ten pore volumes would emit 160 million pounds of CO_2.

[5] Full-scale steam injection using 3 and 6 pore volumes of steam would emit 200 million pounds and 400 million pounds, respectively. Ten pore volumes would emit 650 million pounds of CO_2.

[6] The Staff appear to acknowledge that their view as to when and how GHG emissions should be evaluated in the remedy selection process may be inconsistent with the Obama Administration's policies since they note on several occasions that Montrose may not modify remedy rankings based on GHG considerations "at this time."

against the nine specific criteria set forth in the NCP, which include *overall* protection of human health and the environment, short-term effectiveness, state and community acceptance, and cost. 40 C.F.R. § 300.430(e)(9)(iii)(A), (E), (G)-(I). GHG emissions are an important factor for each of those criteria given (i) the well-documented relationship GHG emissions are thought to have in causing global climate change and its attendant effects on human health and the environment; (ii) the expressly stated concerns by the State of California and the local community regarding GHG emissions and climate change; and (iii) the very substantial costs likely to be incurred in order to implement energy intensive remedies and to offset their significant GHG emissions, as indicated above and discussed more fully in the attached comments.

Third, it is clear that the FS should directly address known state and community acceptance of the remedial alternatives regarding GHG emissions. Contrary to the Staff's contention, such considerations should not be postponed until after the public comment period. The NCP specifically requires that state and community acceptance of identified remedial alternatives be evaluated in the FS. 40 C.F.R. § 300.430(e)(9)(iii)(H), (I). While the analysis cannot be completed until after public comments are received, known information relevant to those factors should be included in the FS when it is presented for public comment. This is particularly true where, as here, the State has established well-documented legislative requirements that are relevant to the control of GHG emissions.

B. Hydraulic Displacement Should Be Fairly Evaluated and Fully Compared To the Thermal Treatment Alternatives

The Staff's comments wrongly contend that the HD remedy fails to meet RAO's 2, 3, 4, and 6, and therefore wrongly require that HD be eliminated from consideration in the final remedy selection process. From past pilot projects at the Site, we already know as a proven fact that HD will safely remove significant quantities of both the MCB and DDT components of the Montrose DNAPL. In a 28-day field pilot study in 1991, 298 gallons of DNAPL were removed from a single well. Similar results were obtained in a 2004/2005 expanded pilot study. Even though thermal remedies might remove more of the MCB DNAPL component than HD, there can be no doubt that HD satisfies each of the RAO's basic requirements, and, therefore, must be preserved for objective analysis and full comparison to the thermal alternatives.

As you know, DNAPL is present at the Site in two forms – mobile and residual. Mobile DNAPL is heavier than water, and therefore, when present in sufficient quantities, is potentially able to physically migrate downward. In contrast, residual DNAPL is trapped within the pore spaces of soils and unable to move, except to the extent that its presence serves as a continuing source of groundwater contamination.

RAO 2 requires that uncontrolled lateral and vertical migration of mobile NAPL be limited to the extent practicable. As noted, HD will remove significant quantities of both the MCB and DDT components of mobile DNAPL, and, therefore, will limit the potential for any future mobile DNAPL movement by removing mass. More specifically, because the majority of mobile DNAPL will be removed by the HD extraction wells, DNAPL pool accumulation to a height of eight feet or more in the sand overlying the base of the Upper Bellflower Aquitard ("UBA") – which would be necessary to create the entry pressure required for penetration – is

improbable. Uncontrolled lateral migration also will not occur during HD implementation because the system is designed so that the flushed mobile DNAPL will flow into the extraction wells. Indeed, Montrose decreased the spacing of HD extraction wells from 50 feet to 25 feet precisely for the purpose of minimizing any potential for fugitive migration of DNAPL during remediation. The only avenue by which DNAPL could enter into the more permeable Bellflower Sand is directly through the basal silty sand layer of the UBA, but the thickness of this layer makes it highly unlikely that DNAPL would be able to penetrate it. Modeling of the potential for such migration further confirms that there is virtually no possibility that this could occur.

Although the Staff wrongly insist that the potential for DNAPL migration during HD remediation is significant and, therefore, HD fails to meet RAO 2, they inconsistently demand that any discussion of fugitive DNAPL movement be eliminated from the analysis of thermal remedies (especially with regard to steam injection). Dr. Davis has variously contended that downward DNAPL migration has never been observed at thermal treatment sites, and most recently in the comments, asserts that migration out of the treatment zone has never been observed. She conveniently overlooks the fact that the issue has not been closely studied at these sites, and, indeed, Staff notes in its comments on HD that any vertical migration would likely not be able to be detected. More importantly, Dr. Davis is simply wrong. In an attempt to support EPA's allegation that Montrose's DNAPL is not unique, they reference the few sites where MCB has been remediated thermally, and in fact in one of those sites – the Taunton Site – there was lateral migration out of the treatment zone. Moreover, the two dimensional steam studies performed on Montrose DNAPL indicated a risk of downward migration. Finally, the high subsurface pressures that would be created in the treatment area by steam injection present the risk of geyser-like releases of volatized hazardous substances up through the numerous boreholes and other potential openings that exist in this area.

RAO 3 calls for the remediation to "[i]ncrease the probability of achieving and maintaining containment of dissolved-phase contamination to the extent practicable, as required by the existing groundwater ROD, for the time period that such containment remains necessary." The Staff now object to the reinjection of untreated groundwater into the more highly contaminated containment zone as being inconsistent with State ARAR's, even though the Staff directed that this analysis be performed and the State previously approved such injections as part of the pilot tests that were conducted. (Thus, it is highly unlikely that this limited reinjection would be prohibited.) Moreover, this injection will help to achieve and maintain containment of dissolved-phase contamination by facilitating the removal of mobile DNAPL, thus eliminating much of the continuing source of groundwater contamination in that zone. (As discussed below, no DNAPL remedy will eliminate groundwater contamination in this area.) In short, the HD extraction wells will contain the injected groundwater in the treatment zone. Moreover, because HD will be implemented in the focused treatment area which is also within the boundaries of the containment zone, the injected groundwater will be "double contained" by both the HD extraction wells and the surrounding groundwater extraction and treatment system.

RAO 4 provides that DNAPL mass be reduced to the extent practicable. The Montrose DNAPL consists of equal parts of MCB and DDT. In the Staff's comments concerning this objective, they now (and for the first time) focus solely on the quantity of MCB DNAPL mass,

and would eliminate any discussion of the removal of the DDT DNAPL component. This is a new and artificial limitation that is not specified in the RAO's but favors thermal technologies because they are expected to remove a greater mass of MCB than HD, but unlike HD, would remove little if any of the DDT DNAPL mass. In fact, HD will remove a greater combined mass of mobile DDT/MCB DNAPL than would thermal remediation. In any event, it is clear that the Staff's comment is designed to understate the removal benefits of HD (by eliminating DDT from the analysis) while overstating the removal efficiencies of thermal technologies (by restricting the analysis to MCB). Reduction of mass "to the extent practicable," however, should not be interpreted to give preference to a technology that achieves the RAO to a greater degree for only a specific contaminant when several are present. Moreover, the FS should and must be focused on both DNAPL contaminants, and also on balancing of all of the other NCP criteria, including cost and cost-effectiveness, implementability, mass removal, and other risk factors presented by the alternatives.

In the similar vein, the Staff have revised their Site DNAPL volume estimates in a way that significantly reduces the volume of mobile DNAPL. As explained in Montrose's technical responses, there are material flaws in this analysis. Staff's motivation for this change is again transparent, however, and consistent with the overall pattern of what they are trying to accomplish through their comments. By artificially re-defining the amount of mobile DNAPL at issue and by eliminating consideration of the mobile DDT component altogether (which thermal barely removes), the Staff by sleight of hand have minimized the estimated amount of DNAPL that HD would remove, while their restricting the mass removal analysis to MCB alone overstates the true efficiency of thermal technologies.

Finally, RAO 6 mandates the reduction of dissolved-phase concentrations within the containment zone, over time, to the extent practicable. By removing a significant amount of the mobile DNAPL mass, HD will simultaneously remove a considerable amount of the existing dissolved-phase contaminant source. This will enhance Montrose's ability to reduce dissolved-phase concentrations within the containment zone over time through the groundwater treatment system that will be implemented under the Groundwater ROD. Importantly, however, neither HD nor any thermal remedy would remove a sufficient amount of residual DNAPL to materially decrease the amount of time during which the groundwater containment/treatment will be needed. HD therefore meets RAO 6 to the same extent as each of the other thermal source removal technologies being evaluated.

As noted, Montrose does not disagree with the Staff's view that thermal technologies would probably do a better job of removing the MCB DNAPL component than would HD. The point, however, is that HD will achieve all of the RAO's, even if it does not achieve some of them to the same degree that thermal does. This, however, is not a reason for eliminating HD from further consideration, but instead is but one factor that should be considered when balancing the overall costs, benefits and shortcomings of HD with the overall costs, benefits and shortcomings of thermal technologies in order to determine which is the more practicable.

C. The Full Costs of the Thermal Remedial Alternatives Should Be Fairly Disclosed and Evaluated so that the Cost-Effectiveness and Practicability of the Thermal Remedies Can Be Fairly Assessed

Under CERCLA and the NCP, a remedial alternative may not be selected unless it is "cost-effective." 42 U.S.C. § 9621(b)(1); 40 C.F.R. § 300.430(f)(1)(ii)(D). A remedy is cost-effective only "if its costs are proportional to its overall effectiveness." 40 C.F.R. § 300.430(f)(1)(ii)(D). Under the existing terms of the NCP, the costs that must be considered include: (1) capital costs, both direct and indirect; (2) annual operation and maintenance costs, and; (3) net present value of capital and operation and maintenance costs. 40 C.F.R. § 300.430(e)(9)(iii)(G). The analysis considers which alternatives offer a reasonable value for the money in light of the results they will achieve, and the requisite proportionality will not be found where the difference in effectiveness is small but the difference in cost is great. 55 Fed. Reg. 8728 (March 8, 1990).[7]

EPA policy documents make clear that EPA is required to consider cost as a critical factor in selecting the preferred remedy. *See* EPA, The Role of Cost in the Superfund Remedy Selection Process, at 5, OSWER Directive 9200.3-23FS (September 1996).[8] It is also clear that Congress intended cost to be a central consideration in the remedy selection process, and the NCP consequently requires costs to be evaluated twice – once with overall costs as a balancing factor, and again to ensure that the costs are proportional to overall effectiveness. 40 C.F.R. § 300.430(f)(1)(i)(B); 40 C.F.R. § 300.430(f)(1)(ii)(D). Indeed, the Remedy Review Board was specifically established to review high-cost remedies, and one of its key goals is to improve the cost-effectiveness of remedies.[9] The Remedy Review Board has declared that where a preferred alternative is significantly more expensive than other alternatives, the rationale for proposing the alternative must justify the incremental cost. *See, e.g.*, National Remedy Review Board Recommendations on the Tex Tim Site, August 15, 1997, at 3.

Along these lines, the Tenth Circuit has ruled that EPA's failure to consider costs and cost-effectiveness provides grounds for a court to invalidate EPA's remedy selection as "arbitrary and capricious." *See United States v. Hardage*, 982 F.2d 1436, 1444 (10th Cir. Okla. 1992). Moreover, the Court of Appeals for the District of Columbia has held that cost-effectiveness should be given the same weight as the remedy's permanence when evaluating remedial alternatives for a site, stating that "[i]f EPA were to require the selection of permanent

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[7] In light of EPA's more recent "green remediation" policies, the cost of mitigating significant GHG emissions should probably also be considered as part of a remedial alternative's overall costs.

[8] The guidance document goes on to state that "through the distribution of this fact sheet, EPA hopes to ensure that all stakeholders involved in the Superfund process fully understand the important role that cost plays in remedy selection under existing law and policy, and to summarize recent initiatives aimed at enhancing the cost-effectiveness of remedial actions. These initiatives include the National Remedy Review Board, Remedy Selection Rules of Thumb, and Updating Remedy Decisions." *Id.* at 1 (emphasis added).

[9] http://www.epa.gov/superfund/programs/reforms/reforms/3-1a.htm.

remedies whenever possible, it would be ignoring the statutory mandate to select cost-effective remedies." *Ohio v. United States EPA*, 997 F.2d 1520, 1532 (D.C. Cir. 1993). Clearly, cost and cost-effectiveness are components that must be carefully considered by EPA when evaluating remedial alternatives.

Not surprisingly, EPA has correctly relied on cost-effectiveness as the deciding factor between alternatives at other sites. *See, e.g.*, EPA Region I, *Record of Decision- Silresim Chemical Corp., Lowell, Massachusetts* at 51 (September 1991) ("Silresim ROD"); *Record of Decision- Raymark Industries, Inc., Stratford, Connecticut* at 24 (July 1995) ("Raymark ROD"). Indeed, at the Silresim Chemical site, EPA selected vacuum/vapor extraction, stabilization and on-site capping (SC-4) despite the fact that other alternatives might have provided a more permanent remedy. In the ROD for that site, EPA stated, "SC-14 provides more permanent protection than SC-4..., however, they both...are...equally protective of direct contact, ingestion and leaching related exposures. Logistical/implementability [and effectiveness] concerns related to [SC-14]...make SC-14 less reliable and therefore less cost-effective proportionate to the selected remedy...The high costs of thermal treatments in proportion to the added long-term protection to human health and the environment are not considered proportionately cost-effective." Silresim ROD at 51 (emphasis added). Likewise, at the Raymark Industries site, EPA selected the less costly remedy because the other alternative would have provided only a marginal increase in long-term effectiveness at twice the cost. Raymark ROD at 24.

From the outset, the Staff have insisted on a number of unrealistic cost assumptions that dramatically understate the probable true cost of thermal remedies, especially with respect to steam injection, and, in numerous meetings with Staff, Montrose has voiced its objections to such assumptions. Montrose's biggest concerns about the Staff-mandated steam remedy cost estimates are: (1) their insistence that this remedy will require only 2 – 3 steam pore volumes in order to achieve extraordinarily high levels of DNAPL MCB removal[10]; (2) the use of less dense well distribution pattern than would be necessary to effectively achieve thermal remediation cleanup objectives;[11] and (3) the determination that conductor casings need not be used to minimize the possibility of further contamination in deeper areas (even though conductor casings

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[10] It is far more likely that at least six pore volumes of steam will be required to achieve significant cleanup levels, and doubtful that any amount of steam flushing would achieve a 0.5% residual DNAPL level, which the Staff would now require Montrose to assume in the FS. The Unocal Guadalupe site, for example, was only able to achieve an average 1.6% residual DNAPL concentration, and it took 21.6 pore volumes of steam to do so – seven to ten times the volume of steam Staff have required Montrose to assume would accomplish a 0.5% cleanup here.

[11] Although Montrose recommended steam injection well spacing of 42 feet in a five-spot pattern, Staff insisted that Montrose use a less dense 60-foot well spacing using a seven-spot pattern, which would result in fewer wells at a lower cost. However, Staff has based MCB removal on results from the Unocal Guadalupe Site at a boring located 15 feet from a steam injection well and where the Pilot Test Panel recommended 20-foot spacing for a full-scale steam injection remedy.

have been required for every investigation and pilot well previously constructed in the area).[12]

Based on the Staff-mandated cost assumptions, the draft FS estimates the cost of steam injection for the focused treatment area to be $24.6 to $25.8 million NPV with a unit cost of $110 to $116 per pound of contaminant removed. ERH for the focused treatment area is estimated to cost $21.2 to $22.9 million NPV with a unit cost of $92 to $101 per pound of contaminant removed. If implemented for the full treatment area, the costs of thermal soar into the range of $60 to $110 million. In order to recover a relatively small amount of additional MCB for full-scale compared to focused thermal (only 10,500 pounds at 4% saturation), it would cost an additional $35 to $85 million NPV, at a unit cost of $3,300 to $8,100 per pound of additional contaminant removed. In contrast, the projected cost of HD is $11.7 million NPV with a unit cost of $33 to $40 per pound of contaminant removed.

Montrose is confident that the following table provides a more realistic projection of the various remedial alternative costs. A principal reason for the dramatic increase in costs for the steam remedy is the certainty that far more than 2 to 3 pore volumes will be required to accomplish an effective removal action, with 6 pore volumes being the likely minimum. Based on this assumption, the full scale steam remediation cost will be nearly 8 times that of HD. More realistically, the cost of and full scale ERH remediation will be about 6 times that of HD.

Estimated DNAPL Remedy Costs using Montrose-Recommended Energy Demands

Candidate DNAPL RA	NPV Cost[1] ($MM)		
	Base Case 3 PVs or 200 Kw-hrs/cu yd	Middle Case 6 PVs or 400 Kw-hrs/cu yd	High Case 10 PVs
HD	$11.7[3]	NA	NA
Steam Injection, Focused	$25.8	$33.6	$46.0
Steam Injection, Full-Scale	$59.7	$85.3	$110.1
ERH, Focused[2]	$21.2	$26.1	NA
ERH, Full-Scale[2]	$53.7	$70.6	NA

Notes:
[1] Includes cost of other RA components including containment, institutional controls, and SVE in the unsaturated zone.
[2] Excludes hot floor
[3] HD cost assuming 25-foot well spacing = $13M NPV; HD cost assuming 50-foot well spacing = $11.7M NPV
NA = not applicable

1. Cost-Effectiveness Evaluation

As demonstrated above, a question that must be evaluated in the FS is whether the additional cost of the thermal remedies is proportional to any overall increase in the degree of

[12] Staff assert that a hot floor would mitigate this risk. No one, however, has implemented a hot floor of the size necessary for, or under the challenging conditions present at, the Site. Furthermore, of the seven hot floors that have been attempted, two failed.

protectiveness achieved. Although steam and ERH may remove more MCB mass than HD, the groundwater containment system will remain necessary for several thousand years regardless which source removal technology is used because even the thermal remedies will leave enough residual contamination in place to continue contaminating groundwater in the small containment zone for that long. Thus, any additional MCB mass that could be removed by a thermal technology (even over the full treatment area) would not materially improve long-term effectiveness or permanence of the remedy, or substantially alter the remedy's impact on overall site remediation. In other words, thermal will cost significantly more to implement without any truly appreciable increase in the overall remedial benefits of source removal at the Site. Nor are the enormous costs of thermal alternatives justified by any increase in short-term effectiveness, given the many potential risks associated with implementation of a thermal remedy.

Based on EPA's own precedents, an alternative may not be deemed cost-effective where it involves significantly higher costs than other alternatives and has the potential to adversely affect the environment and human health through increased emissions. For example, at the Central Chemical Superfund Site, EPA found that two of the remedial alternatives were not cost-effective, even though both would have removed a greater volume of contamination than the selected remedy, because both were significantly more expensive than other alternatives and were "associated with concerns pertaining to . . . the potential for creation of air emissions which may be a threat to remediation workers and the nearby community." EPA Region III, *Record of Decision- Central Chemical Superfund Site, Hagerstown, Maryland* at 2-47 (September 2009).

Here, a thermal remedy should remove more of the DNAPL MCB component than HD. On the other hand, HD will achieve all RAO's to a reasonable degree. The additional amount of MCB removal achieved by thermal will not, however, provide environmental benefits significantly greater than those achieved by HD (if at all), and the cost of achieving such non-material marginal benefits comes at an exceptionally high price. In fact, thermal remedies may be even less effective than HD in terms of overall protectiveness of the environment considering their very high levels of GHG emissions and the risks of uncontrolled DNAPL migration and fugitive vapor releases. Consistent with statutory and agency guidance, thermal technologies therefore cannot be found to be cost-effective relative to HD because their additional costs are not justified by a proportional increase in overall effectiveness.

2. Practicability Analysis

Even if a thermal remedy were cost-effective, it would also have to be found to be the most practicable, and that requires a balancing of the relative benefits and detriments of the competing alternatives. In this regard, it is clear that neither HD nor thermal is perfect. HD will remove most, but not all, mobile DNAPL. The amount of mobile DNAPL that remains, however, will be too small to present a significant risk of further migration. HD also will not remove any residual DNAPL, which will continue to be a source of groundwater contamination in the small containment zone for several thousand years. On the other hand, HD will substantially achieve all RAO's at a relatively low cost, and the action itself will have a very small environmental footprint, including very low GHG emissions.

While the thermal remedies should do a better job than HD of removing the MCB

component of both mobile and residual DNAPL, they will not remove any of the DDT DNAPL component, and even though relatively more effective than HD in this regard, and they will still leave in place a level of residual MCB contamination that will serve as a continuing source of groundwater contamination in the containment area for thousands of years. On the other hand, thermal remedies are extremely expensive. Thermal remedies also have huge energy demands and consequently also have large GHG emissions that have their own significant adverse impacts. Thermal remedies may also pose short term environmental and human health risks as a result of volatizing toxic chemicals, which Staff would have Montrose understate, and also pose some risk of mobilizing DNAPL during the remediation process, which Staff would prevent Montrose from discussing at all. Taken as a whole, thermal remedies may actually be less protective overall than HD – if anything, the additional protection that those remedies would provide through greater MCB removal would be very modest.

Based on a fair balancing of all competing considerations, it is clear that HD is a more practicable and cost-effective remedy than either of the thermal options.

III. CONCLUSION

After reviewing the Staff's comments, we are yet again left with the inescapable conclusion that the Staff want to force Montrose to prepare a DNAPL FS that for all intents and purposes compels the selection of a thermal DNAPL remedy based on an artificially constrained analysis. This is disappointing and surprising since Montrose has worked successfully and cooperatively with EPA on all other major aspects of the Site remediation.[13]

Nevertheless, the fact remains that Montrose and the Staff are still at loggerheads on this one remaining, albeit very substantial, remedial issue. And now, to make matters worse, compliance with all of the Staff comments would further frustrate rather than facilitate an objective evaluation of each remedial alternative under all of the NCP's criteria, which is required by law in order to provide the decision-maker with the information necessary to select the best overall approach. Instead, the Staff's comments are an obvious effort to dictate a result based on an artificially limited remedial alternatives analysis that would: (1) prohibit any serious consideration of HD by overstating its risks and shortcomings and understating its benefits; and (2) as to thermal, require Montrose to drastically understate these remedies' costs and their environmental and human health risks (including GHG impacts), and to dramatically overstate their removal efficiencies. Forcing Montrose to develop this type of non-objective "heads I win

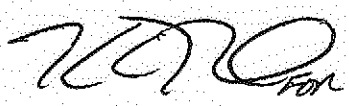
[13] For example: (1) Montrose and EPA are well into the design of the groundwater remedy and Montrose expects to be able to enter into remedial action consent decrees for the groundwater later this year; (2) the soils feasibility study is well underway and presently appears to be headed towards a remedy that Montrose expects it will be able to support and implement; (3) Montrose and EPA have already entered into consent decrees or other agreements covering (i) EPA's past administrative costs, (ii) settlement of the Neighborhood Soils removal action, (iii) removal of contaminated sediments from the LACSD sewer lines, (iv) resolution of response costs claims regarding the current water drainage way, and (v) the complete resolution of all response cost and natural resource damage claims for the Los Angeles Harbor and the Pacific Ocean.

tails you lose" analysis is in blatant conflict with the NCP's requirements for a full and fair comparison of remedial alternatives.

We hope at least, however, that we can agree on this if nothing else: let us do what Congress intended and what its laws and EPA's regulations require. Let us fully and fairly set forth the best information available on the benefits, shortcomings, detriments and costs of thermal and HD remedies so that the decision-maker has access to the information necessary for an accurate and fully informed balancing of their relative merits. If we do not do that, there is no hope of selecting a protective, practicable and cost-effective DNAPL remedy for the Site.

Montrose's detailed position on the foregoing legal issues is set forth in the attachment. Montrose's responses to the Staff's technical comments are set forth in separate correspondence. We look forward to our meetings on May 5 and 6, and hope that we can agree then to a mutually acceptable path forward. Please call me if you have any questions or concerns in advance of our meeting.

Very truly yours,



Karl S. Lytz
of LATHAM & WATKINS LLP

ATTACHMENT A

MONTROSE RESPONSES TO LEGAL ISSUES RAISED IN STAFF COMMENTS ON DNAPL FS

I. GENERAL COMMENTS

General Comment 5: Greenhouse Gas (GHG) Emissions Should Not Be Used To Screen Out DNAPL Remediation Alternatives. *There are numerous statements in the FS pertaining to the steam remedy and Electrical Resistance Heating (ERH) emitting higher quantities of greenhouse gases (GHG) than other alternatives. This criterion is used in numerous places in the FS as one of the reasons for lower ranking of thermal alternatives. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP), does not allow such an approach. Green remediation goals may be considered in the context of short term effectiveness in the nine criteria analysis of the FS, however short term effectiveness is also balanced against the long term effectiveness and permanence of the remedy. Creation of GHG emissions does not in itself provide sufficient justification to preclude remediation. Considering and minimizing GHG is more appropriate at the remedial design (RD) stage, after the best alternative has been selected by the FS based on the NCP's nine criteria analysis. Please remove statements regarding GHG emissions from all sections of the report beyond the discussion of short term effectiveness. Further, the FS should equally consider that GHGs emissions are also associated with HD, including DNAPL disposal and transport which add to life-cycle emissions.* **And Specific Comments 6, 7, 13, 37, 85, 106, 112, 122, 124, 131, 135, 159, 160, referring to General Comment 5 and/or indicating that GHG emissions should not be a criteria in evaluating DNAPL remedial alternatives**.

Response: Montrose strongly disagrees with the Staff's comment that GHG emissions may not be considered in the FS, other than in the context of short-term effectiveness, and that the consideration and minimization of GHG emissions should be deferred until the RD stage. To the contrary, numerous EPA policy documents make clear that the reduction of GHG emissions should be considered "during any phase of work, including…evaluation of cleanup options," and that feasibility studies appropriately may "include comparison of the environmental footprint expected from each cleanup alternative, including GHG emissions . . . ." EPA, Principles for Greener Cleanups at 1 (Aug. 27, 2009); EPA, Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites at 20, EPA 542-R-08-002 (April 2008) (hereinafter "EPA Green Remediation Primer"). Other EPA guidance indicates that the FS is the "optimal phase" in which to begin evaluating GHG reduction measures. EPA Region 9, Smart Energy Resources Guide at 2, EPA/600/R-08/049 (March 2008) (hereinafter, "EPA Energy Guide"). Simply put, the Staff's assertion that the FS for the Montrose Site should not consider GHG emissions expected from cleanup alternatives directly contradicts EPA's own policy documents.

Furthermore, the NCP requires the FS to contain a comprehensive evaluation of each remedial alternative, and GHG emissions are a proper consideration under each NCP factor, not merely short-term effectiveness. In this regard it is notable that the EPA's Green Remediation Strategy states that "[g]reen remediation options should be evaluated under CERCLA

requirements and relevant NCP provisions as a means to help ensure protectiveness of human health and the environment." EPA, Superfund Green Remediation Strategy at 5 (August 2009)[14] ("EPA Green Remediation Strategy"). Because Staff has requested that Montrose include in the FS a detailed evaluation of full-scale thermal remedies, which would have a significantly greater carbon footprint than the remedies considered in the draft FS, the importance of a thorough assessment of GHG emissions in evaluating and ranking remedial alternatives is critical here.

Finally, notwithstanding its position that GHG emissions should not be considered until the RD stage, Staff criticize the FS for not considering GHG emissions associated with DNAPL disposal and transport under the HD remedy. Montrose included GHG emissions from an HD remedy in the FS, as it did for all remedial alternatives, and it agrees that GHGs from disposal and transport for each remedial alternative should be added to the analysis, which will further increase the GHG estimates for each and provide a more realistic picture of the total GHG impact.

Set forth below are Montrose's detailed responses to Staff's General Comment 5.

A. EPA, Council on Environmental Quality and State of California Policies Support the Inclusion of GHG Analysis in the Feasibility Study

Staff's suggestion that GHG analysis should be deferred until the RD phase, after an RA has already been selected, is contradicted by a number of recent federal and State agency publications. For example, numerous EPA policy documents recognize that opportunities to reduce GHG emissions for site cleanups begin with the site investigation and continue through development of cleanup alternatives. *See, e.g.,* EPA, Superfund Green Remediation Strategy at 2 (August 2009) ("EPA Green Remediation Strategy") and EPA Green Remediation Primer at 20. Indeed, the EPA's Green Remediation Strategy "sets out current plans to respond to the need to reduce GHG and other air emissions and minimize other negative impacts on the environment . . . that might occur during remediation of a hazardous waste site..." EPA Green Remediation Strategy, at 1. The EPA's Green Remediation Primer recognizes that in accordance with these green remediation strategies, "feasibility studies could include comparison of the environmental footprint expected from each cleanup alternative, including GHG emissions. . . ." EPA Green Remediation Primer at 20 (emphasis added). A core element of green remediation involves reducing GHGs from treatment processes. EPA Green Remediation Strategy at 2 and EPA Green Remediation Primer at 1; EPA Principles for Greener Cleanups at 3 and 4.

Other statements from documents published by EPA provide further confirmation that green remediation goals -- including the minimization of GHG emissions -- should be considered well before the RD phase, and, in particular, in the RI/FS phase:

- "Green remediation [including reduction of GHGs] involves understanding and addressing the effects of selected response actions, from the early assessment phases

[14] In May, EPA expects to release a "more robust" version of the Green Remediation Strategy. BNA Daily Environment Report, *EPA Likely to Release 'More Robust' Version of Green Site Remediation Strategy in May*, 56 DEN A-6 (Mar. 25, 2010).

through remedy selection and implementation to long term operation, maintenance, and project closeout." EPA Green Remediation Strategy at 3 (emphasis added).[15]

- "Green remediation comprises a range of best practices that can be applied throughout the Superfund cleanup process, beginning with site assessment and investigation and extending through remedy operations." EPA Green Remediation Strategy at 5.

- "Remedial Investigation and Feasibility Study (RI/FS): "[W]hen developing options for remedial actions that are consistent with [RAOs], project managers should consider alternatives that include opportunities for reducing the environmental footprint of remedial design." EPA Green Remediation Strategy at 6.

- "An **optimal phase** in which to start considering [reducing GHGs] is during the Remedial Investigation/Feasibility Study (RI/FS) phase of cleanup." EPA Region 9, Smart Energy Guide at 2.

- "OSWER cleanup programs should consider these Principles for Greener Cleanups [including GHG reduction] during any phase of work, including site investigation, evaluation of cleanup options, and optimization of the design, implementation, and operation of new or existing cleanups." EPA, Principles for Greener Cleanups at 1, 2 (Aug. 27, 2009).

In light of the above, Staff's request to postpone evaluation of GHG emissions for the Montrose Site until the RD phase proposes an inappropriate and unfounded departure from EPA policy that should not be followed, particularly in light of the significant GHG emissions associated with thermal remedial alternatives.

Another example of the increasing emphasis placed by federal agencies on addressing the environmental impacts from GHG emissions is the draft guidance recently issued by the Council on Environmental Quality with regard to GHG analysis in the context of the National Environmental Policy Act ("NEPA"). Council on Environmental Quality, Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (Feb. 18, 2010) (hereinafter "CEQ"). The guidance states that, where a proposed action implicates significant levels of GHG emissions, information on GHG emissions that is useful and relevant to the decision should be considered in connection with the evaluation of alternatives. CEQ at 1, 2. The guidance also indicates that the lead agency should identify alternative actions that would mitigate the GHG emissions that cause climate change. CEQ at 11.

The draft CEQ guidance is persuasive here, given the similarity between the alternatives analysis required in an environmental impact statement under NEPA, and the alternative evaluation process included in the FS. Where a remedial alternative could generate significant GHG emissions, EPA, the State and the public should consider this fact when deciding which remedy is most suitable for the Montrose Site. Further, given the many EPA documents

[15] Unless otherwise noted, all emphases in this response are added by author.

instructing project managers to consider GHG emissions throughout the cleanup process, the FS properly considered GHGs when evaluating and ranking each remedial alternative.

Additionally, in December 2009, the California Department of Toxic Substances Control (" DTSC") released an Interim Advisory for Green Remediation that encourages an evaluation of the regional and global impacts of all emissions generated for each remedial alternative. DTSC Advisory at 2–3. The DTSC Advisory specifically applies to feasibility studies, and its "Green Remediation Evaluation Matrix," used to compare treatment alternatives, requires a GHG analysis for every component of remediation, including emissions from remedial technologies such as thermal oxidizers. DTSC Advisory at 1, 15. Thus, in remedial actions overseen by DTSC, California requires a comprehensive evaluation of GHG emissions to ensure that the remedial alternative selected is optimal for environmental, economic, and social sustainability. DTSC Advisory at 3–4.

Staff's contention here that Montrose must wait until the RD phase to consider GHG impacts finds no support in law and is contradicted by EPA policy documents—indeed, EPA is currently developing a "roadmap" for project managers to reduce GHG emissions during remedy selection, which will be designed to maintain consistency with NCP criteria for remedy evaluation. EPA Green Remediation Strategy at 16. Staff's contention is also contrary to the federal standards set forth by the CEQ in its 2010 guidance and by the State of California in its 2009 Interim Advisory.

B. The National Contingency Plan Requires the Feasibility Study to Evaluate GHGs under Multiple Criteria

1. GHG Emissions Analysis Is Consistent With the Goals of the NCP and Relevant EPA Policies

Montrose disagrees with the Staff's comment stating that GHG emissions may be considered only in the context of short-term effectiveness within the nine criteria set forth in the NCP. First, "[t]he primary objective of the . . . (FS) is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected." 40 C.F.R. § 300.430(e). The remedies should be protective of human health and the environment, and maintain that protection over time, among other things. 40 C.F.R. § 300.430(a)(1)(i). Compiling site-specific data and evaluating alternatives should reflect the scope and complexity of the site problems being addressed. 40 C.F.R. § 300.430(e). For each alternative, EPA must evaluate potentially suitable technologies and conduct a detailed analysis of each remedial alternative. 40 C.F.R. § 300.430(e)(2)(ii); § 300.430(e)(9). Remedial alternatives should eliminate, reduce, or control risks posed by a site through each pathway. 40 C.F.R. § 300.430(e)(2). The remedial alternatives are analyzed by evaluating each against the nine specific criteria set forth in the NCP, which include overall protection of human health and the environment, short-term effectiveness, State and community acceptance, and cost. 40 C.F.R. § 300.430(e)(9)(iii)(A), (E), (G)-(I).

Staff's position that GHG emissions considerations should be limited to short-term effectiveness is inconsistent with EPA policy, which, as noted, provides that GHG emissions can

be considered in the FS under each of the NCP criteria, as appropriate. For example, the EPA Green Remediation Strategy states that "green remediation options should be evaluated under CERCLA requirements **and relevant NCP provisions**. . . ." EPA Green Remediation Strategy at 5. The EPA Strategy's use of the plural "provisions" confirms that GHGs may be evaluated under more than one of the NCP's criteria, and, logically, should be evaluated under each as is applicable to the particular site. Furthermore, EPA is developing a policy to clarify how "green remediation can be factored into the nine evaluation criteria," illustrating that EPA itself recognizes that GHGs are an appropriate consideration under the nine criteria of the NCP, rather than solely short-term effectiveness. EPA Green Remediation Strategy at 7.

A comprehensive consideration of GHG emissions associated with each remedial alternative, in the context of each of the applicable nine NCP criteria, is an important function of the FS and selection of a remedy. If the FS failed to consider GHGs under each NCP criteria, it would fail to evaluate the elimination, reduction, or control of risks posed by the remedy itself, as required by the NCP. *See* 40 C.F.R. § 300.430(e)(2).

Given the scope of the cleanup and complexity of remedial alternatives, and the potentially significant GHG emissions associated with certain of the alternatives, the FS for the Montrose Site should consider in detail the potential GHG emissions of each remedy so that the decision-maker is provided with the information necessary to select a remedy that is consistent with the NCP. 40 C.F.R. § 300.430(e). Therefore, under the NCP and in conformance with EPA policy and directives, the FS must evaluate impacts associated with GHG emissions under multiple NCP criteria. While five of the NCP's criteria are discussed in detail below, Montrose believes that GHG emissions are appropriately considered under all nine of the NCP criteria.

2. Remedies with Significant GHG Emissions are Not, Overall, Protective of Human Health and the Environment

As a "threshold" criterion, remedial alternatives must be assessed to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances present at the site. 40 C.F.R. § 300.430(e)(9)(iii)(A) and (f)(i)(A). Overall protection of human health and the environment draws on the assessments of other evaluation criteria including long-term effectiveness, short-term effectiveness, and compliance with ARARs. *Id.*

Logically, a remedial alternative may be inadequate where the remedy itself presents risk to human health. *United States v. Vertac Chemical Corp.*, 588 F. Supp. 1294, 1296 (E.D. Ark. 1984). In *Vertac Chemical Corp.*, the remedial plan negotiated between the state and the PRPs called for on-site containment of buried waste. 588 F. Supp. at 1296. EPA's alternative, on the other hand, called for excavation and reburial at an off-site location. *Id.* The court found that although off-site reburial had some advantages, the risks of exposure from excavation exceeded any additional safety achieved by this procedure. *Id.* Accordingly, the court found that the PRP's negotiated plan was superior to EPA's alternative in terms of overall protection of human health. *Id.*

Under this line of reasoning, risks to human health and the environment that may result from climate change caused by GHG emissions must be considered in evaluating remedial

alternatives for the Montrose Site. Numerous legislative and administrative actions by the federal government have recognized that GHG emissions are dangerous to human health because they contribute to climate change. For example, the Energy Policy Act of 2005 reflects an overarching national policy to reduce the level of GHG emissions due to climate change concerns. Energy Policy Act of 2005, § 1610(c). More recently, on December 7, 2009, EPA found that current and projected concentrations of GHGs in the atmosphere threaten public health and welfare. 74 Fed. Reg. 66496 (Dec. 15, 2009). EPA Administrator Lisa Jackson commented that "greenhouse gas pollution is a serious problem now and for future generations." Press Release, EPA, EPA Finds Greenhouse Gases Pose Threat to Public Health, Welfare/Proposed Finding Comes in Response to 2007 Supreme Court Ruling (April 17, 2009). Moreover, EPA has relied on a study suggesting that, once generated, CO_2 persists in the atmosphere for approximately 100 years, demonstrating the long-term nature of impacts from GHG emissions.[16]

Given recognized risks from increased GHG emissions, the FS should evaluate GHG emissions from each remedial alternative to determine whether or not the alternatives satisfy threshold requirements in the NCP requiring such alternatives to adequately protect human health and the environment, in both the short and long term. This is particularly true for the Montrose Site, where the cumulative GHG emissions from a thermal remedy could be significant. If the harm from a remedial alternative's GHG emissions outweighs its incremental benefits, then that alternative is inconsistent with the NCP and impracticable for the Site. 40 C.F.R. § 300.430(a)(iii)(A). Removing the evaluation of GHG emissions as a threshold criterion, however, and deferring such analysis until the RD stage, forestalls an accurate assessment of whether a particular remedy is, on balance, protective of human health and the environment as a whole, and could lead to the selection of an inappropriate remedy. Accordingly, the different GHG profiles of the remedial alternatives must be considered first to ensure the remedy is consistent with the NCP.

3. GHG Intensive Remedies Are Not Effective in the Short-Term

The NCP's "short-term effectiveness" criterion addresses risks that may result from the implementation of the proposed remedial action. 40 C.F.R. § 300.430(e)(9)(iii)(E); 55 Fed. Reg. at 8722. EPA concedes that green remediation goals, including reducing GHG emissions, may be considered in the context of short-term effectiveness, which is balanced with other criteria. General Comment 5, EPA Comments to Draft DNAPL Feasibility Study. As explained above, GHG emissions and their contribution to climate change have the potential to endanger human health and the environment.

Given the huge volume of GHG emissions that would result from a thermal remedy and the persistence of CO_2 in the atmosphere once emitted (~100 years), implementing any remedy that results in a significant net increase in GHG emissions involves a risk to human health and

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[16] *See* Science – High GWP Gases – Climate Change – U.S. EPA, http://www.epa.gov/highgwp/scientific.html (relying on IPCC's Second Assessment Report (SAR) (1995)). Section 4.6 of the SAR states that "[carbon dioxide] has a relatively long residence time in the climate system—of the order of a century or more." The SAR is available at http://www.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf.

the environment. Accordingly, the FS must include a comprehensive analysis of GHG emissions to provide the public with the information necessary to understand and comment upon the risks associated with implementing each remedial alternative, and so that the decision-maker may take those risks into account when selecting a remedial alternative.

4. The State of California and the Community of Torrance Are Unlikely To Accept a Remedy with Significant GHG Emissions

As "modifying" criteria, the NCP requires the FS to evaluate state and community acceptance of the remedial alternatives under consideration. 40 C.F.R. § 300.430(e)(9)(iii)(H), (I) and (f)(i)(C). Here, State laws and community actions reflect a consensus that reducing GHGs should be a priority throughout all phases of remedial planning.

Regarding State acceptance, California has "announced" through its adoption of precedent-setting environmental laws that it is deeply concerned about GHG emissions and associated climate change impacts. For example, Assembly Bill 32 ("AB32"), adopted by California's Legislature in September 2006, establishes a comprehensive regulatory scheme designed to achieve quantifiable reductions of GHG emissions. Cal. Health & Safety Code §§ 38500 *et seq.* Because AB32 regulates sources of GHG emissions that emit more than 25,000 tonnes of GHGs per year, California would undoubtedly have reservations about accepting a remedial alternative, like focused steam injection or either full-scale thermal technology, that would cross this threshold and constitute a significant source of new GHG emissions. Furthermore, regardless whether a remedial technology exceeds the specific threshold established in AB32, California has demonstrated its concern about, and interest in, reducing any and all GHG emissions, and likely would disfavor any remedial alternatives with larger carbon footprints relative to other alternatives, particularly if the greater GHG emissions are not justified by a genuine and significant increase in overall protectiveness that more than offsets the remedy's GHG damages.

For example, as part of the California Environmental Quality Act, Public Resources Code section 21000, et seq., ("CEQA"), California has developed regulations for assessing and mitigating GHG emissions that are applicable to the discretionary approval of covered development projects by state and local agencies. *See, e.g.*, Cal. Pub. Res. Code § 21083.05 (regulations for mitigating GHG emissions must be developed; 14 Cal. Code Regs. §§ 15064.4 (guidelines for determining the significance of GHG emissions); § 15236.4(c) (guidelines for mitigating GHG emissions); § 15183.5 (guidelines for analysis of GHG emissions).

Moreover, as discussed above, DTSC's Interim Advisory on Green Remediation makes it clear that GHG emissions from a proposed remedy will be a primary focus of the State's review and acceptance of the action. DTSC Advisory at 1-4, 15.

With regard to community acceptance, abundant information indicates that residents, local politicians, and local businesses in the City of Torrance are also concerned about GHG emissions and climate change. For example, in 2007, the City of Torrance endorsed the U.S.

Mayors Climate Protection Agreement, and pledged to reduce CO_2 pollution.[17] Further, the Torrance Area Chamber of Commerce has aligned with federal and state initiatives to "go green" and has developed a website to disseminate environmental information to local businesses.[18] The Torrance newspaper, *The Daily Breeze*, has reported favorably on environmental fairs, green summits and expos, and municipal purchases of hybrid buses, among other things.[19] The City's representative in the State Legislature, State Senator Jenny Oropeza, championed Senate Bill 104, which proposed modification of AB32 to include the regulation of nitrogen triflouride.[20] Likewise, Torrance's City Council has recognized the climate change research of a local high school teacher.[21] The level of interest in GHG emissions and climate change expressed by the City of Torrance strongly weighs in favor of including such analysis in the FS, rather than deferring the analysis to a future time.

In light of the well-documented positions of the State of California and the community of Torrance regarding GHG emissions, the FS must include an evaluation of public and state acceptance of GHG emissions and climate change when ranking remedial alternatives. 40 C.F.R. § 300.430(e)(9)(iii)(H)-(I). Therefore, contrary to EPA's position in General Comment 5, it is appropriate to consider State and community acceptance of the proposed thermal remedies in the FS.[22]

5. GHG-Intensive Remedies Involve High Costs and Are Not Cost-Effective

The NCP also requires that cost and cost-effectiveness be considered in the evaluation of remedial alternatives. 40 C.F.R. § 300.430(e)(9)(iii)(G) and (f)(ii)(D). "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." 40 C.F.R. § 300.430(f)(ii)(D).

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[17] Torrance City Council Agenda, Regular Meeting at § 9 (April 3, 2007), *available at* www.ci.torrance.ca.us/PDF/agenda_cover_4-3-07.pdf

[18] Green Torrance– Business go green thrive!, http://www.greentorrance.com/aboutus.html.

[19] Green, N., *Torrance To Hold First-Ever Environmental Fair on Saturday*, The Daily Breeze (June 12, 2009), *available at* http://www.dailybreeze.com/news/ci_12582017?source=rss; Staff Editorial, *Green Ideas Taking Root*, The Daily Breeze (June 15, 2009), *available at* http://www.dailybreeze.com/ci_12595892; Green, N., *Torrance Will Use Stimulus Money to Buy 10 Hybrid Buses*, The Daily Breeze (June 10, 2009), *available at* http://www.dailybreeze.com/news/ci_12563671

[20] Senator Jenny Oropeza – Pro-environment bill would regulate gas 17,000 times more damaging than carbon dioxide, http://dist28.casen.govoffice.com/index.asp?Type=B_PR&SEC=%7B158155BF-B41C-452C-A7E3-439790D3B207%7D&DE=%7B290455E2-E7C2-4431-B262-19902FA3C1AE%7D

[21] Mather, K., *Arctic Trek Brings Global Warming Into New Focus*, The Daily Breeze (July 19, 2009), *available at* http://www.dailybreeze.com/latestnews/ci_12873669.

[22] Furthermore, EPA's position that State and community acceptance should not be considered relative to GHG emissions is contradicted by Specific Comment 111, in which EPA contends that the State and public are not likely to accept certain aspects of an HD remedy.

Because federal and state laws regulating GHG emissions will affect the overall cost of a remedial alternative, GHG emissions must be evaluated in the FS. More specifically, GHG emissions will be cost drivers because Montrose would likely be required to purchase offsets to mitigate emissions from a remedial alternative, or invest in renewable technologies to meet state Renewable Portfolio Standards. Pursuant to its endangerment finding discussed above, EPA was to promulgate final rules regulating GHG emissions from light-duty vehicles by the end of March 2010, thus making GHGs "regulated air pollutants," and also subjecting stationary sources to PSD and Title V New Source Review permit requirements. As a result, new remediation projects with large carbon footprints will have to comply with updated Clean Air Act regulations. In addition, under AB32, Montrose may be required to purchase offsets for GHG emissions in excess of 25,000 tonnes per year, which would be the case for focused steam injection and either full-scale thermal remedy.

Even where a remedial alternative is considered to be superior with regard to long-term effectiveness, an alternative may not be cost-effective where it involves significantly higher costs than other alternatives and has the potential for increased air emissions. For example, EPA's Record of Decision for the Central Chemical Superfund Site in Maryland evaluated several remedial alternatives for cleaning up a site contaminated with DDT. Although two of the alternatives would have removed a greater volume of contamination, both of those alternatives were significantly more expensive than other alternatives considered, and also were "associated with concerns pertaining to . . . the potential for creation of air emissions which may be a threat to remediation workers and the nearby community." EPA Region III, *Record of Decision-Central Chemical Superfund Site, Hagerstown, Maryland* at 2-47 (September 2009). Accordingly, neither remedial alternative was found to be cost-effective.

At the Montrose Site, the future costs associated with GHG emissions will vary depending upon the remedial alternative selected. Because each remedial alternative offers a different GHG profile, the FS must consider GHG emissions in order to assess the costs and cost-effectiveness of the alternatives being considered, including the associated costs of complying with federal and state laws.

Evaluating GHG emissions in the FS provides the public with the best opportunity to consider and comment on an accurate estimate of the costs associated with each remedial alternative. Accordingly, the FS correctly included GHG emissions for each alternative, and it would be inappropriate to postpone GHG review until the RD phase.

General Comments 2 and 8 (and Specific Comments 25, 67, 115, 123, 131, 144, 160): The following is a paraphrase of the listed EPA comments: Removal of DDT is not a RAO.

Response: DDT constitutes approximately half of the Montrose DNAPL mass, and DDT is mobile in the subsurface when present in mobile DNAPL, as a DNAPL component. Therefore, removal of DDT is directly applicable to achieving RAO's 1, 2, and 4. In particular, removal of the DDT component is critical in order to (i) prevent potential human exposure to DNAPL constituents, mainly in mobile DNAPL, so as to achieve RAO 1; (ii) limit uncontrolled lateral and vertical migration of mobile DNAPL through removal of mobile DNAPL as a whole, including its DDT component, so as to achieve RAO 2; and (iii) reduce DNAPL mass, so as to

achieve RAO 4. As such, removal of the DDT component of the DNAPL should be considered in evaluating compliance with RAO's.

General Comment 9 (and Specific Comments 57 and 148): Referencing the Del Amo FS with Regard to the Applicability of Thermal Treatment is not Appropriate. *There are numerous statements in the FS referencing the Del Amo FS with regard to the use of thermal remedy. The use of thermal treatment at the Del Amo site was considered for treatment of benzene light nonaqueous phase liquid (LNAPL), which typically does not pose the same magnitude of risk as a DNAPL in its potential to contaminate deeper water-bearing zones if left untreated. The dissolved benzene plume also does not migrate laterally and vertically as much as the MCB plume. In addition, there are numerous other considerations at the Del Amo site, such as presence of buildings, that may not apply to the remedy selection at this site. Based on the above, referencing the Del Amo FS with regard to the applicability of thermal treatment is not appropriate.*

Response: Montrose recognizes that, in response to thermal remedial technologies, the LNAPL at the Del Amo site may behave differently than the Montrose DNAPL, due to differences in their chemical make-up and properties. But the Del Amo site is contiguous to the Montrose Site, and the two sites share very similar (and in certain areas identical) geology and site characteristics, making the Del Amo site a relevant and appropriate comparison for analyzing the implementability and likelihood for operational success of any remedial alternative being considered at the Montrose Site, including thermal. Indeed, the complex geology and physical site conditions was one factor that led to the selection of a non-thermal remedy for Del Amo.

EPA contends that the presence of buildings and workers on the Del Amo site is not a valid consideration with regard to the applicability its thermal treatment analysis to the Montrose Site. However, like at Del Amo, there are businesses and workers in very close proximity to the DNAPL-impacted area at the Montrose Site, such as the businesses just north of the Montrose property on former Boeing property. Because steam injection poses the threat of lateral migration of DNAPL as well as above-ground fugitive emissions, the businesses and buildings on the former Boeing property and on the Del Amo site are relevant to any consideration of the potential risks of implementing steam injection at the Montrose Site. Further, an active chemical plant is being operated on the Jones Chemical property, just south of the Montrose property, in close proximity to locations where a thermal remedy would be employed, which poses additional and unique concerns about implementing a thermal at the Montrose Site.

General Comment 10: The following is a paraphrase of EPA's comment: Alternative 4 Does Not Comply with RAOs 2, 4 and 6.

Response: Hydraulic displacement ("HD") satisfies all of the RAO's, including RAOs 2, 4 and 6. RAO 2 states: "[t]o the extent practicable, limit uncontrolled lateral and vertical migration of mobile DNAPL under industrial land use and hydraulic conditions in groundwater." HD will not cause uncontrolled lateral migration of mobile DNAPL. Rather, the flushing of mobile DNAPL that will occur through HD will be specifically engineered and controlled so that it flows into extraction wells. Montrose does not expect lateral migration of DNAPL outside the focused treatment area, during implementation. Montrose recognizes that HD will capture most (80%)

but not all of the mobile DNAPL,[23] and that there could be some amount of mobile DNAPL that will not be removed through the extraction wells. But this is inherent in any technology that involves flushing and fluid transport, and the same concerns exist for thermal remedies, which will certainly not be able to remove all of the residual DNAPL at the Site.

Nor will HD cause uncontrolled vertical migration of mobile DNAPL. The only avenue in which DNAPL could enter into the Bellflower Sand ("BFS") is directly through the basal silty sand layer of the Upper Bellflower Aquitard ("UBA"), which is thick enough to provide ample retention capacity for DNAPL. Considering the site geology, it is unlikely that DNAPL would be able to penetrate the basal silty sand and reach the BFS. In particular, a mobile DNAPL pool would have to accumulate in the overlying sand at the base of the UBA, to a height of more than eight feet, in order to exceed the entry pressure of the silty sand at the base of the aquitard. Because the vast majority of the mobile DNAPL will be removed by the extraction wells, pool accumulation to this height is highly unlikely. Moreover, DNAPL pool height will be reduced further as a result of the tendency of the pools to spread out during HD operation. Finally, any downward mobilization is likely to be obstructed by multiple perching layers and smaller scale heterogeneities that are present throughout the UBA.

RAO 4 states: "[r]educe NAPL mass to the extent practicable." Although HD may not remove the same quantity of MCB as the thermal technologies being evaluated, HD will remove more combined mobile DDT/MCB DNAPL mass than the steam injection or ERH alternatives, and the thermal remedies will remove little (if any) of the DDT DNAPL component, which constitutes about 50% of the total DNAPL mass at the Site. Therefore, HD may actually achieve RAO 4 to a greater extent than those alternatives, based upon the removal of both components of DNAPL mass, as a whole. Further, reduction of mass "to the extent practicable" does not necessarily designate the remedial alternative with the highest MCB mass removal. Factors other than the percentage of mass removal must be considered in determining what is "practicable," such as implementability, cost and other risk factors presented by the alternative.

RAO 6 states: "[t]o the extent practicable, reduce the dissolved-phase concentrations within the containment zone over time." Through removal of a significant amount of the mobile DNAPL mass, HD will remove a considerable amount of the existing dissolved-phase contaminant source. This will enhance Montrose's ability to reduce dissolved-phase concentrations within the containment zone over time, through the groundwater treatment system to be implemented under the Groundwater ROD. In addition, none of the remedial alternatives considered in the draft FS would remove enough DNAPL, or its constituents, to materially decrease the amount of time for which the groundwater containment and treatment will be needed. Therefore, HD meets RAO 6 to the same extent as each of the other source removal techniques under consideration.

Notably, EPA has previously found that hydraulic displacement-type remedies for DNAPL removal have satisfied RAOs similar to Montrose RAOs 2, 4, and 6. For example, at the American Creosote Works, Inc. site in Pensacola, Florida, part of the selected remedy was DNAPL recovery using a combination of water, alkaline, surfactant and polymer flooding with

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[23] Eighty percent is a conservatively low estimate. HD achieved 95% removal of NAPL at the Laramie site in Wyoming.

DNAPL/water separation and groundwater treatment. At that site, EPA determined that the remedy met an RAO requiring "management of migration of the pollutants beyond the existing limits of the known contaminant plume," which has protective goals similar to those found in Montrose RAO 2. Also, at the Calhoun Park Area site in Charleston, South Carolina, the selected DNAPL recovery method was removal of NAPL and impacted groundwater by extraction wells installed in the shallow and intermediate aquifers underlying the source areas. EPA found that such method of DNAPL removal satisfied an RAO requiring "removal or treatment of NAPL to the maximum extent practicable," which is nearly identical to Montrose RAO 4.

II. SPECIFIC COMMENTS

Specific Comment 13: Public Acceptance. *Refer to General Comment 5 regarding the use of GHG emissions as a critical criterion in evaluating DNAPL remediation alternatives. The presence of GHG emissions should not be used to pre-screen alternatives and the best alternative should be selected based upon the NCP's nine criteria analysis. Similarly to State Acceptance, the FS should not speculate upon Community Acceptance at this time, which will be deferred until after the public comment period. At this point the FS should only state that the community will likely to be very interested in understanding the remedies and may raise concerns with each of them.*

Response: See Response to General Comment 5 regarding the propriety of including GHG emissions in the analysis of remedial alternatives.

Contrary to the Staff's comment, the NCP requires that State and community acceptance of identified remedial alternatives be evaluated in the FS. 40 C.F.R. § 300.430(e)(9)(iii)(H), (I). Although assessing State and community acceptance cannot be *completed* until comments on the RI/FS are received, known information relevant to these factors should be considered in the FS that is presented to the public for comment. *See id.* EPA guidance confirms as much, providing that "[i]f known at the completion of the RI/FS, state [] and community acceptance of the alternatives should be considered . . . to identify the preferred alternatives." EPA, Guide to Selecting Superfund Remedial Actions at 4, OSWER Directive 9355.0-27FS (April 1990). Similarly, pursuant to EPA's Principles for Greener Cleanups, the evaluation of cleanup alternatives should involve close consultation with local communities regarding the environmental impacts of a particular response action. EPA Principles for Greener Cleanups at 1, 2. Furthermore, in Specific Comment 111, Staff commented that the State and public are not likely to accept certain aspects of an HD remedy, an implicit acknowledgment on EPA's part that State and community acceptance issues may be considered in the FS.

Accordingly, it is appropriate to evaluate State and community acceptance in the FS, given the abundance of evidence showing that the City of Torrance and State of California have a demonstrated concern with regard to GHG emissions and climate change issues, and are committed to GHG emissions reduction efforts, as described above. See Response to General Comment 5, at B.4.

Specific Comment 37: TBCs and GHG emissions. *Please see the current guidance regarding green remediation in Superfund. According to EPA's Principles for Greener Cleanups,*

alternatives that do not satisfy threshold requirements for protectiveness, or do not meet other site-specific cleanup objectives, are not considered to be "greener":

> *"These Principles for Greener Cleanups are not intended to allow cleanups that do not satisfy threshold requirements for protectiveness, or do not meet other site specific cleanup objectives, to be considered greener cleanup. The Principles are not intended to trade cleanup program objectives for other environmental objectives. Successful green cleanup practices can help achieve cleanup objectives by ensuring protectiveness while decreasing the environmental footprint of the cleanup activity itself. Some examples include using equipment that emits less particulate matter to the air, sizing equipment accurately to avoid wasted energy, water, and material, and using renewable energy or recycled material to decrease greenhouse gas emissions and conserve resources." Mathy Stanislaus, Assistant Administrator for OSWER, August, 27, 2009, http://www.epa.gov/oswer/greencleanups/principles.html.*

Response: Montrose agrees that remedial alternatives that are otherwise inadequate cannot become acceptable simply because they may have certain "greener" attributes. However, in selectively quoting from its Principles for Greener Cleanups, EPA overlooks the fundamental principle in that document providing that GHG emissions and other "green" elements should be evaluated "**during any phase of work, including . . . evaluation of cleanup options,**" in order to reduce the environmental footprint of the cleanup to the maximum extent possible. EPA Principles for Greener Cleanups at 1–2. EPA makes no effort to reconcile its comment with this principle enunciated in the same policy document that it cites.

Of course, GHG emissions should not "trump" all other necessary considerations for protectiveness, or be used to validate a remedial alternative that, in all other respects, is inconsistent with RAOs or NCP requirements, and Montrose has not argued otherwise. But GHG emissions are an important part of the NCP's threshold and balancing criteria for Montrose's Site, and should be evaluated to ensure that the selected remedy will be, overall, protective of human health and the environment, effective in the short term, appropriate with regard to cost and cost-effectiveness, and accepted by the State and community, for the reasons detailed above.

Specific Comment 38(1): Chemical Specific ARARs, Authority: Clean Water Act (CWA) or Federal Water Pollution Control Act (FWPCA). *The entirety of the Clean Water Act is not an ARAR for any of the remedial alternatives. At most, the substantive provisions of 33 USC sections 1311, 1313, 1314, 1317 and 1342 may be ARARS. Please limit the USC and CFR citations accordingly. Further, both the statutory and regulatory CWA provisions should be identified as "Applicable", not "Relevant and Appropriate", if Montrose will be discharging through an outfall to the storm water system. In addition, the Water Quality Objectives set forth in the Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties should be added if there is a potential for surface water quality to be impacted (e.g., potential for breakdown products.)*

Response: Montrose agrees that the entire CWA is not an ARAR, and will limit the substantive provisions of the CWA that are used as ARARs, as suggested by this comment, and revise the ARARs section accordingly. Montrose will not be discharging into the storm water system; nor is there any potential for impacts to surface water quality, because all of the DNAPL RAs under consideration involve reinjection of groundwater. Therefore, the provisions of the CWA are appropriately designated as "Relevant and Appropriate," and the Water Quality Objectives set forth in the Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties do not need to be added as ARARs.

Specific Comment 38(3): Chemical Specific ARARs, Maximum Contaminant Levels (MCLs) for Drinking Water, 40 CFR §§ 141.11-141.16, and the Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. *For those remedial alternatives that contemplate reinjection of water, the MCLs identified at Table 9-1 of the Groundwater ROD will be relevant and appropriate. As explicitly set forth in the Groundwater ROD, MCLs were not waived for reinjection: "[S]tate and federal MCLs, as ARARs for reinjecting treated groundwater, are not waived inside the Technical Impracticability Waiver Zone. EPA finds that there is no acceptable basis for waiving these ARARs as reinjection standards - given that it is technically feasible to treat the hazardous substances found in groundwater at the Joint Site to state and federal MCLs ...." ROD at pages A-8, A-9.*

Response: Montrose disagrees that the MCLs indentified at Table 9-1 in the Groundwater ROD are relevant and appropriate reinjection standards for those remedial alternatives that contemplate reinjection of water. Those MCLs are waived as treatment standards inside the Technical Impracticability ("TI") Waiver Zone, authorized in the Groundwater ROD, which encapsulates the entire DNAPL impacted area wherein any DNAPL remedial action will be conducted. By contrast, MCLs as reinjection standards were appropriate ARARs for the groundwater remedy because, under that remedy, groundwater would be injected into the aquifer upgradient of the TI Waiver Zone, outside of the boundaries covered by the waiver. Conversely, under any candidate DNAPL remedy, any groundwater above MCLs will be injected and remain completely within the TI Waiver Zone, and captured by the containment system to be implemented under the groundwater remedy and treated through the groundwater treatment system. Thus, Montrose does not believe that MCLs are applicable or relevant to the reinjection of groundwater in a DNAPL remedy within the TI Waiver containment zone.

Specific Comment 38(5): *Action-Specific ARARs, State Water Resources Control Board Resolution No. 68-16. This requirement should be identified as "Applicable" rather than "Relevant and Appropriate". Resolution 68-16 was adopted as an applicable requirement in the Groundwater ROD (see ROD at page A-9), and was not included in the TI waiver. The "Action to be Taken" language is misleading and needs to be revised.*

Response: Montrose listed this policy, Resolution No. 68-16, as "Relevant and Appropriate," rather than "Applicable," because it believes that this policy may not necessarily apply to reinjection of groundwater, even untreated groundwater. The policy ensures that existing high quality groundwater is not diminished by discharges that may adversely affect existing water quality. California's Anti-degradation policy applies to high quality (Tier 2) waters only; that is, groundwater that exceeded the quality mandated in the Basin Plan when it initially became effective, and which has not subsequently been downgraded in accordance with the policy. In

other words, the policy is generally applicable when the receiving aquifer is pristine or only slightly contaminated, and is not triggered if the receiving ground water is not of high quality due to the contaminated plume. Thus, the Anti-degradation policy requires that, if baseline water quality exceeds water quality objectives, it must be maintained, unless certain criteria are met.

The groundwater in the DNAPL-impacted area is not pristine and is already more highly contaminated than the untreated groundwater that would be reinjected to flush mobile DNAPL out of this area. Therefore, the current groundwater quality at the Site will not be diminished by this temporary injection in the short-term, and will be somewhat improved in the long-term by the removal of a considerable volume of mobile DNAPL. At the Montrose Site, any injection of untreated groundwater would not migrate outside of the containment zone, which encapsulates the DNAPL-impacted area in which any DNAPL remedial technology would be employed. EPA guidance states that, "[a]t a CERCLA site...state groundwater anti-degradation law might preclude the injection of partially treated water into a pristine aquifer. It would not, however, require cleanup to the aquifer's original quality prior to the contamination, nor would it preclude the reinjection of partially treated water back into the already contaminated portion of the aquifer as long as the reinjection does not increase the existing level of contamination." ARAR Q's and A's: General Policy, RCRA, CWA, SDWA, Post-ROD Information, and Contingent Waivers, Publication 9234.2-01/FS-A (June 1991). Here, none of the expected discharges under any of the DNAPL remedial alternatives would increase the existing level of contamination in the impacted aquifers. Indeed, the HD system would act as an additional level of containment, even further ensuring that untreated groundwater does not migrate beyond the containment zone or decrease the existing levels of contamination in surrounding areas. Moreover, when Montrose conducted the DNAPL extraction pilot testing in 2004/2005, both EPA and the State approved the reinjection of untreated water into the DNAPL impacted zone. For the reasons discussed, such a waiver would be appropriate, if necessary under the circumstances, for implementation of RA 4.[24] Further, through removal of mobile DNAPL, HD will benefit, rather than diminish, groundwater quality.

Finally, Montrose requests that EPA provide further input on why it believes that the "Action to be Taken" language is misleading, so that Montrose can evaluate EPA's position and respond accordingly.

Specific Comment 38(7): Action- Specific ARARs Solid Waste Disposal Act and Resource Conservation and Recovery Act, 40 CFR Part 261 is not an ARAR for this remedy. *The DNAPL at issue has already been determined to be a hazardous waste.*

Response: Although the DNAPL itself may be deemed a hazardous waste under 40 CFR Part 261, Part 261 may also be applicable to the classification of materials and wastes, other than the actual DNAPL, that could be generated in connection with a DNAPL remedy. As such, Montrose believes that 40 CFR Part 261 may be an appropriate ARAR depending upon the DNAPL remedy and the waste streams it produces.

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[24] The Laramie site in Wyoming received regulatory approval to re-inject untreated groundwater in order to facilitate an aggressive HD remedy, through which they successfully removed 95% of the mobile DNAPL.

Specific Comment 38(8): Action-Specific ARARs, Solid Waste Disposal Act and Resource Conservation and Recovery Act, 40 CFR Part 262 and 22 CCR §§66262.10 et. seq. *The "synopsis" language needs to be revised as it makes assumptions about the remedial action and does not in fact summarize the requirements. The first two sentences under "Action to be Taken" should be deleted and replaced with the following: "DNAPL associated with the former operations of the Montrose plant is a hazardous waste. In the course of remediating the DNAPL contamination, DNAPL will be generated, accumulated and possibly stored, and transported for off site disposal." The last sentence is fine.*

Response: As requested by this comment, Montrose will remove the first sentence of the "Synopsis" language and revise the "Action to be Taken" description to read: "DNAPL associated with the former operations of the Montrose plant may be classified as a California and/or RCRA hazardous waste, depending upon its concentration and characteristics. In the course of remediating the DNAPL contamination, DNAPL will be generated, accumulated and possibly stored, and transported for off site disposal."

Specific Comment 38(11): To Be Considered, NAAQS and California Ambient Air Quality Standards. *National and State Ambient Air Quality Standards are not independent requirements and should not be identified as TBCs. The AAQS are incorporated into and are enforceable pursuant to the South Coast Air Quality Management District Rules, which have been identified as applicable requirements. The AAQS should not be referenced unless there is a particular pollutant or contaminant that Montrose believes is not addressed in the SCAQMD rules; if that is the case, Montrose should clearly identify relevant pollutant or contaminant.*

Response: Montrose believes that National Ambient Air Quality Standards ("NAAQS") and California Ambient Air Quality Standards ("CAAQS") are appropriate TBCs, or "To Be Considered" materials. EPA guidance defines TBCs as "criteria, advisories, guidance, and proposed standards, developed by Federal and State environmental and public health agencies, that are not legally enforceable but contain information that would be helpful in carrying out, or in determining the level of protectiveness of, selected remedies." CERCLA/ Superfund Orientation Manual, EPA/542/R-92/005 at XII-3 (EPA 1992). TBCs are meant to complement, rather than compete with or replace, the ARARs. Although NAAQS and CAAQS are enforced though SCAQMD Rules and Regulations, the NAAQS/CAAQS may contain guidance or goals that would not necessarily be incorporated in to the SCAQMD Rules and Regulations, but which would still be appropriate to provide direction in connection with determining the level of protectiveness of certain remedies. Thus, NAAQS and CAAQS are appropriate TBCs.

Specific Comments 38(12), 38(13) and 38(14): The following is a paraphrase of a portion of the listed EPA comments: The identified policies and guidance documents are not appropriate TBCs.

Response: The Staff contend that AB32, the EPA Policy on Green Remediation, and the EPA Smart Energy Resources Guides are not proper TBCs for the evaluation of remedial alternatives. As explained in the preceding response, TBCs, are non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of ARARs. But TBCs may be useful in determining the protectiveness of a particular remedy, or in calculating the necessary level of cleanup. CERCLA/Superfund Orientation Manual,

EPA/542/R-92/005 at XII-3 (EPA 1992) and CERCLA Compliance With Other Laws Manual: Interim Final (Parts I and II), EPA/540/G-89/006 (EPA 1989). Where particular remedial alternatives may cause significant GHG emissions, California's AB32, the EPA Green Remediation Primer and the EPA Energy Guide are each a perfect example of TBCs that are not legally binding, but will help to evaluate the usefulness, appropriateness and overall protectiveness of the various remedial alternatives. Thus, each of these documents is an appropriate TBC, as explained in more detail below.

Specific Comment 38(12): To Be Considered, California Global Warming Solutions Act of 2006 (AB32). *California's Global Warming Solutions Act (AB32) should not be identified as TBC. AB32 sets forth directives for the California legislature and contains no specific guidance in the form of cleanup goals or policies that can be applied to any proposed remedial actions at the Site. Montrose may not modify the ranking of alternatives on the basis of GHG emissions at this time.*

A brief note on TBC material: Any material identified as TBC in a ROD becomes an enforceable requirement, equivalent to an ARAR. However, if EPA excludes material from TBC status, it does not mean that the material should not in fact be considered during remedial design. The goals of AB32 are also consistent with EPA's green remediation goals to be accommodated in remedial design.

Response: Montrose disagrees with the Staff's initial assessment that AB32 is not a TBC because it contains no specific guidance in the form of cleanup goals or policies that can be applied to any proposed remedial actions. But the ARAR process and EPA's Green Remediation Primer encourage participation in State and local initiatives that promote natural resource and energy conservation. *E.g.*, EPA Green Remediation Primer at 43. AB32 and its implementing regulations are one example of that type of initiative, and will be useful in determining how to carry out a particular remedy relative to the identification and mitigation of its GHG emissions. AB32 regulates "sources" of significant GHG emissions, and requires significant emitters to monitor their emissions and report them to the State. Cal. Health & Safety Code §§ 38505(i), 38530(b)(1). AB32 also requires California to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions, in order to meet statewide GHG emissions limits. Cal. Health & Safety Code §§ 38560.5, 38562(a). Early action to reduce GHG emissions is encouraged, and future legislation may require the purchase of offsets for emitters of significant amounts of GHGs. Cal. Health & Safety Code § 38562(b)(1).

Contrary to Staff's contention that AB32 contains "no specific guidance," AB32 sets a 2020 limit for GHG emissions at 1990 levels. Cal. Health & Safety Code § 38550. In December 2007, the California Air Resources Board ("CARB") established the limit at 427 million metric tonnes of carbon dioxide equivalents. AB32 has also established mandatory GHG reporting requirements. 17 Cal. Code Regs. § 95100, *et seq.* Furthermore, CARB has released draft cap and trade regulations, and the first compliance period will begin on January 1, 2012. CARB, Overview: Preliminary Draft Regulation For A California Cap-and-Trade Program at 5 (Nov. 24, 2009).

Finally, it is undisputed that the chosen remedial action for the Montrose Site will generate GHG emissions, and that the NCP's modifying criteria require an evaluation in the FS

of State acceptance. Through AB32, California has adopted a clear policy intended to significantly reduce GHG emissions state-wide. In its 2009 Interim Advisory for Green Remediation, DTSC directed that the regional and global impacts from remedial action GHG emissions be evaluated as an important component of identifying appropriate remedies. In order to conduct the requisite evaluation of California's acceptance of any remedial alternative, AB32 and its implementing regulations are useful in determining what levels of GHG emissions would be considered significant. This is particularly true in connection with focused steam injection or either full-scale thermal remedy, all three of which would produce GHG emissions in excess of 25,000 tonnes per year. Any cap-and-trade regime likely to be instituted under AB32 could also significantly alter the cost of carbon-intensive remedial alternatives. Because AB32 encourages early action to assess and reduce GHG emissions, the FS is an appropriate place to incorporate AB32 into the assessment of remedial selection. Finally, recent federal reporting requirements resemble AB32's emission thresholds. For these reasons among others, AB32 is an appropriate TBC as defined by EPA guidance.

Specific Comment 38(13): To Be Considered, EPA Policy [sic] on Green Remediation, April 2008. *EPA has not yet issued a policy on green remediation. In April 2008, EPA published a technology primer titled "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites." Following the acknowledgements at page i, the primer provides the following notice: "As a primer, this document provides topical introductory information rather than guidance." Topical introductory information does not constitute the type of advisory or guidance intended to be incorporated as TBC. Montrose may not modify the ranking of alternatives on the basis of GHG emissions at this time.*

Response: Montrose believes that the EPA Green Remediation Primer is an appropriate TBC in the FS. Staff contend otherwise, on the basis that the primer only provides "topical introductory information rather than guidance." But the EPA Green Remediation Primer outlines Best Management Practices, identifies sustainable alternatives, and provides guidance to project managers with regard to balancing remedial alternatives within existing regulatory frameworks. EPA Green Remediation Primer at 1–2. As discussed above, TBCs are not limited to formal EPA "guidance,"[25] and the EPA Green Remediation Primer includes useful tools and practices to ensure that the cleanup of the Montrose Site considers GHG reductions in every aspect of the remedial process. Thus, the EPA Green Remediation Primer is a valid TBC, as defined in EPA guidance and discussed above.

In addition to the Green Remediation Primer, EPA also issued its Superfund Green Remediation Strategy in 2009 for public comment. Like EPA's Primer, DTSC's 2009 Interim Advisory on Green Remediation, CEQ's February 2010 Draft NEPA Guidance on Consideration

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[25] The EPA has defined TBCs as "criteria, advisories, guidance, and proposed standards, developed by Federal and State environmental and public health agencies, that are not legally enforceable but contain information that would be helpful in carrying out, or in determining the level of protectiveness of, selected remedies." CERCLA/Superfund Orientation Manual, EPA/542/R-92/005 at XII-3 (EPA 1992); *see also* CERCLA Compliance With Other Laws Manual: Interim Final (Parts I and II), EPA/540/G-89/006 (EPA 1989).

of the Effects of Climate Change and Greenhouse Gas Emissions, and EPA's 2009 Remediation Strategy (apparently to be issued in a more "robust" form in May 2010) all also call for the consideration of GHG emissions when evaluating remedial options. Frankly, we find it more than ironic that the nation's lead agency for environmental protection is taking the position that a remedy that could emit something in the range of 203.9 million to 647.5 million or more pounds of carbon dioxide (full scale steam injection operation in the range of 3 to 10 pore volumes of steam) could be selected for implementation in the Los Angeles air basin with no consideration whatsoever of such massive GHG emissions.

Specific Comment 38(14): To Be Considered, Smart Energy Resources Guide (Energy Guide), EP A/600/R-08/049. *The Smart Energy Resources Guide does not constitute a TBC advisory or guidance. The Guide only "provides information on available mechanisms to reduce [GHG] emissions at cleanup sites" – it does not and cannot require emission reductions or set health-based levels for GHG emissions. Montrose may not modify the ranking of alternatives on the basis of GHG emissions at this time.*

Response: Montrose disagrees with the comment's contention that the EPA's Energy Guide does not constitute a TBC. The comment states that the Energy Guide merely "provides information on available mechanisms to reduce [GHG] emissions at cleanup sites," and cannot require emission reductions or set health-based levels for GHG emissions. But this comment ignores the TBCs' role in the remedial process. TBCs need only be *useful* in deciding how to carry out a remedy or determine the level of cleanup—by definition, TBCs are never legally binding and therefore can never require a specified level of performance (otherwise, they would be ARARs).

EPA's Energy Guide was created to help Region 9 project managers reduce the GHG emissions resulting from Superfund cleanups. EPA Energy Guide at 2. To that end, EPA's Energy Guide discusses various environmentally friendly technologies, and, significantly, emphasizes that project managers should consider GHGs during the RI/FS phase of a cleanup. Because EPA's Energy Guide is useful in determining which remedial alternatives will further (or frustrate) EPA's goal of reducing GHG emissions, it appropriately qualifies as a TBC.

Specific Comment 47: Hydraulic Displacement, Implementability. *The potential fouling of injection wells should also be discussed. What provisions under this option would be considered if DNAPL groundwater extraction rates become limited by reinjection rates? The DNAPL FS states that, "If reinjection of untreated groundwater is selected as the disposal process option for the remedy, then administratively, the reinjection limits specified in the groundwater ROD would need to be waived in order to implement the remedy (which was approved for the 2004/2005 extraction test)." Reinjecting untreated groundwater above the limits specified in the ROD would require a formal TI waiver application, which would require more substantive documentation than what appears to be implied in this section.*

Response: A waiver of limits specified in the ROD for reinjection of groundwater under RA 4 is appropriate. Temporary reinjection of untreated groundwater into the heavily contaminated DNAPL-impacted zone, itself a subset of the TI waiver zone, in order to flush out mobile DNAPL, will not adversely affect groundwater quality in and around the DNAPL impacted area. This is particularly true considering that any reinjection of untreated groundwater will occur only

for a few years, which is insignificant given that the groundwater treatment system will continue to operate to contain and treat contaminated groundwater in the reinjection area. Such a waiver was granted by EPA and the State for the 2004/2005 extraction testing, and reinjection of untreated groundwater during that testing did not adversely impact groundwater quality within the area. A similar waiver, if one is ultimately required, would be reasonable given (i) the past approvals from the State and EPA; (ii) the limited duration and volume of untreated groundwater injection; (iii) the "double containment" provided by the HD system and the groundwater treatment system; and (iv) the fact that HD would actually improve, rather than degrade, groundwater quality by removing mobile DNAPL from the subsurface.[26]

Any DNAPL removal action that includes injection of groundwater will be conducted entirely within the TI Waiver Zone, as established in the Groundwater ROD, and will be contained and treated through the groundwater treatment system. In addition, the extraction and injection pumping under HD will also act to contain the injected groundwater, creating a "double containment" effect. EPA has already established that it is technically impracticable to treat groundwater in that area to MCLs, therefore, it is not unreasonable to request that EPA waive reinjection limits within the TI Waiver Zone for a very limited period of time during which the DNAPL removal action will be conducted. Reinjection of untreated groundwater through the DNAPL remedy will not impact Montrose's ability to comply with treatment standards under the Groundwater ROD. For these reasons, Montrose believes that it is appropriate for EPA to issue a **waiver** of reinjection limits for injection of untreated groundwater in connection with a DNAPL remedy.

Moreover, EPA and the State have previously allowed reinjection of untreated water in this area as part of the DNAPL extraction pilot tests in which groundwater from the DNAPL-impacted area was extracted, passed through an in-line DNAPL/water separator and filter system and returned to the UBA via injection wells. EPA itself requested that this option be evaluated, the Los Angeles RWQCB approved the undertaking in August 2003, and EPA gave its formal approval in February 2004. Doing so again on a temporary basis as part of an HD remedy is not going to degrade groundwater in this small, highly contaminated area. Moreover, as discussed above, there will be ample hydrologic controls to insure the reinjected water does not further spread contamination.

Specific Comments 106, 131, 135, 160, 162: Reinjection of untreated groundwater does not comply with ARARs.

Response: Please see our response to Specific Comment 47 above. Reinjection of untreated groundwater has been approved by both EPA and the State in the past. Montrose therefore requests that EPA identify which ARARs it believes would be violated through reinjection of untreated groundwater. Montrose further requests an explanation as to why temporary reinjection of untreated water back into the already highly contaminated DNAPL-impacted area for the purpose of flushing out mobile DNAPL would not be approved in the future.

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[26] Indeed, such a waiver was approved at the Laramie site in Wyoming for implementation of an HD remedy.

Specific Comment 12, 135, 160, 162: Reinjection of untreated groundwater does not achieve RAOs 3 and 6.

Response: HD with reinjection of untreated groundwater will achieve all of the RAOs, including RAOs 3 and 6. RAO 3 states, "[i]ncrease the probability of achieving and maintaining containment of dissolved-phase contamination to the extent practicable, as required by the existing groundwater ROD, for the time period that such containment remains necessary." Reinjection of untreated groundwater into the highly contaminated, DNAPL-impacted portion of the TI Waiver Zone in connection with RA 4 will help to achieve and maintain containment of dissolved-phase contamination through HD, by facilitating the removal of mobile DNAPL as a continuing source of groundwater contamination. Further, injection of untreated groundwater will not have any negative impact on achieving and maintaining containment. In fact, the HD system of extraction and injection pumping will act to contain the injected groundwater. Therefore, because HD would be implemented in the focused treatment area, and because all of the groundwater injected as part of that remedy will be injected within the boundaries of the containment zone, the injected groundwater will be "double contained" by both the HD system and the groundwater treatment system implemented under the Groundwater ROD, and ultimately treated by the groundwater treatment system. As such, the only potential effect of reinjection of untreated groundwater would be to increase Montrose's ability to achieve or maintain containment within that area through mobile DNAPL source removal. Thus, RA 4 will satisfy RAO 3.

Similarly, reinjection of untreated groundwater will not hinder RA 4 from achieving RAO 6, which states, "[t]o the extent practicable, reduce the dissolved-phase concentrations within the containment zone over time." As with RAO 3, temporary reinjection of untreated groundwater into the DNAPL-impacted area of the TI Waiver Zone, in connection with HD, will improve Montrose's ability to reduce the dissolved-phase concentrations within the containment zone over time through mobile DNAPL source removal. Importantly, injection of untreated water will not negatively impact this goal. Indeed, reinjection of untreated water will not increase the ongoing source of dissolved-phase contamination in the DNAPL impacted area, nor will it influence successful operation of the groundwater treatment system to reduce dissolved-phase contaminants. Similarly, such injection will not increase the operating duration of the containment and treatment system necessary to eliminate the groundwater contamination within the area where the reinjection will occur. Because reinjection of untreated groundwater, in connection with HD, will enhance Montrose's ability to successfully reduce dissolved-phase concentrations over time through DNAPL removal, and will not change the amount of time that groundwater treatment is necessary, RA 4 satisfies RAO 6.

Specific Comment 111: HD with Untreated Water Injection, State Acceptance, Public Acceptance. *In the past, the community has expressed concerns regarding the manner in which generated wastes from remedial activities are treated and disposed. Disposal of wastes generated under the HD alternative would be subjected to the same concerns as wastes generated under any other alternative. The injection of untreated water is not likely to meet with acceptance from either the State or the public.*

Response: Montrose agrees that State and public acceptance of each alternative should be considered in remedy selection, as evidenced by Montrose's inclusion of State and public

acceptance of thermal remedies, and potential GHG emissions from such remedies, as a consideration in the FS analysis. We do not agree that the proposed reinjection of untreated groundwater likely will not receive State acceptance since the State and EPA have previously approved this very action at the Site. Please see the response to Specific Comment 47 above.

More generally, the potential State or public concern raised by the Staff with regard to methods of waste treatment and disposal stem from a perceived or actual risk to human health or the environment, and a potential degradation of existing environmental conditions. But reinjection of untreated groundwater, in connection with HD, will not pose any of these threats. In particular, reinjection of untreated groundwater will not increase existing contamination in the receiving groundwater, nor will it negatively impact current beneficial uses. Also, reinjection will not spread contaminated groundwater, because all untreated groundwater will be injected within the containment zone established in the Groundwater ROD, where it will be precluded from migrating and will be captured and treated through the groundwater treatment system. In addition, as discussed previously, the extraction and injection pumping from the HD remedy itself will act to contain the groundwater injected during operation of the system. Thus, reinjection of untreated groundwater does not pose a risk of spreading contamination in the environment or reducing the current groundwater conditions of the receiving aquifer.

Likewise, reinjection of untreated groundwater will not pose any risk to human health or the environment. Because the untreated water will be injected into the containment zone, there is no risk that the reinjected water could migrate to previously unimpacted areas or have any other adverse effect on the environment. For the same reasons, there is no risk that the reinjected water might migrate to current drinking water sources or pose any other risk to human health. Because reinjection of untreated groundwater will not pose any risk to human health, the environment, current environmental conditions or beneficial uses, Montrose believes that RA 4 will satisfy State and public acceptance criteria.

Finally, the State and the public will likely accept reinjection of untreated groundwater in an area where it will be fully contained and ultimately treated, rather than a thermal remedy with a significantly larger carbon footprint and the potential for other harmful impacts resulting from extreme heating of the soil and groundwater in-situ. Numerous enactments by the State expressing a clear concern regarding climate change impacts caused by GHG emissions, and implementing state-wide efforts to reduce such emissions, indicate that GHG reduction efforts are of utmost importance to the State and the public. Increased State and public acceptance of RA 4 may be particularly likely where, as here, the overall protectiveness of the various alternatives is not meaningfully different. Likewise, past public sentiments against the harmful environmental impact of thermal remedial technologies suggest that the public will be more accepting of RA 4 than a thermal alternative.

Specific Comment 156: Dissolution timeframes and Cost. *The FS states that none of the RAs can remove a sufficient amount of DNAPL to meaningfully reduce the timeframe required for hydraulic containment, and hence there is no cost benefit associated with the accelerated source area treatment by thermal remediation. However, the timeframes required for hydraulic containment (i.e., source dissolution timeframes) are not RAOs for the DNAPL remedy. Therefore, the cost benefit analysis should be focused on other parameters, such as removal of DNAPL mass and prevention of downward migration, as opposed to the timeframes for source*

dissolution. Based on the estimates presented in Specific Comment 155, there is a significant cost benefit in using the thermal remedy for remediation of DNAPL at the Montrose site compared to HD, because the unit NPV cost for removal of DNAPL mass is much lower for the thermal remedy than for HD.

Response: The timeframes required for hydraulic containment (or dissolution timeframes) are a relevant consideration in evaluating whether technologies meet RAOs and the NCP criteria. Consideration of remedy duration is a factor that is commonly addressed in feasibility studies and the remedy selection process. Indeed, remedial timeframes were evaluated in both the Joint Groundwater FS for the Montrose and Del Amo sites, and in the Soil and NAPL FS for the Del Amo site. *See* EPA Region IX, *Final Joint Groundwater Feasibility Study for the Montrose and Del Amo Sites, Los Angeles, California*, at 10-9-10-10 (May, 18 1998) and EPA Region IX, *Final Soil and NAPL Feasibility Study – Del Amo Superfund Site, Los Angeles, California*, at Section 9 (January, 15 2010) ("Del Amo Soil/NAPL FS"). In fact, the Del Amo Soil/NAPL FS specifically considered the reduction in the amount of time that the containment zone would be necessary under various remedial alternatives. *See* Del Amo Soil/NAPL FS, at 9-3, 9-5, 9-7, 9-9, 9-13.

Further, dissolution timeframes directly relate to RAO 6, which states, "[to] the extent practicable, reduce the dissolved-phase concentrations within the containment zone over time." The containment system will be pumping for several thousand years, continuing to reduce the dissolved-phase concentrations in groundwater over time. The dissolution timeframes analysis illustrates that, although thermal technologies might remove more MCB mass than HD, such mass removal will not materially impact the number of years that the containment system will need to operate in order to achieve RAO 6, relative to HD.

The dissolution timeframes analysis is also an important consideration under the cost/cost effectiveness and long term effectiveness criteria for remedy selection set forth in the NCP. 40 C.F.R. § 300.430(e)(9)(iii)(C),(G) and (f)(ii)(D). Thus, a consideration of dissolution timeframes should be included in the remedial alternatives screening analysis. The preamble to the NCP states that "[c]ost is considered in determining cost-effectiveness to decide which options offer a reasonable value for the money in light of the results they achieve." Preamble to Regulation, 55 Fed. Reg. 8729 (March 8, 1990). Clearly, the extent to which a source removal action will materially impact the necessity of long-term remedial activities is a relevant consideration to determine the overall benefit of the source removal. As such, it is appropriate to consider that the fact that thermal technologies, which will cost significantly more than HD, will not materially alter the duration and necessity for continuing long-term remedial action relative to HD.

Not only is cost/cost effectiveness a requisite consideration under the NCP, it is also a key goal of the National Remedy Review Board ("NRRB"). Indeed, one of the NRRB's four goals is to "[i]mprove remedy cost-effectiveness."[27] Further, one of the factors used by NRRB

[27] http://www.epa.gov/superfund/programs/reforms/reforms/3-1a.htm.

to measure its success is through cost savings that are achieved in site cleanups.[28] Surely, the NRRB will find it relevant, from a cost savings/cost effectiveness stand-point, that residual DNAPL will remain in the subsurface for thousands of years under any DNAPL remedial alternative. This would provide a continuing source of groundwater contamination, in a location where it has already been determined to be technically impracticable to restore groundwater to drinking water levels within a reasonable timeframe. Therefore, it would not be cost-effective to spend tens of millions of dollars more to remove an unconfirmed amount of MCB mass, where such increased costs will not be justified by any material reduction in the amount of time that the residual DNAPL will continue to impact groundwater.

Finally, dissolution timeframes are relevant in assessing the long-term effectiveness and permanence of the remedy. Specifically, the duration of containment system operation necessary to manage the treatment of residuals would not materially differ as between HD and thermal. Dissolution timeframes are also integral to the analysis of overall long-term impact of mass reduction. Regardless of how much MCB is removed by a source removal technology, the groundwater containment system will be necessary for several thousand years; thus, the additional MCB mass that could be removed by a thermal technology, relative to HD, would not materially alter the impact of the removal technology on the overall site remediation, or the protectiveness of such mass reduction.

[28] *See id.* (listing as one of the NRRB's accomplishments, "As of FY01, the Board had reviewed a total of 59 cleanup decisions with estimated savings of over $80 million.").